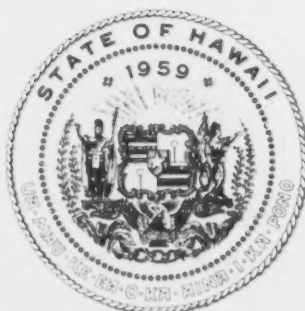


S2090-5

Hawaii Population and Economic Projection and Simulation Model

Updated State and County Forecasts



RESEARCH AND ECONOMIC ANALYSIS DIVISION
DEPARTMENT OF PLANNING AND ECONOMIC DEVELOPMENT

JULY 1984

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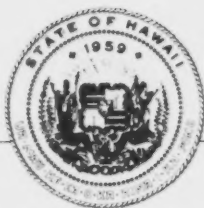
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July 17, 1984

MEMORANDUM

TO: All Users of Population and Economic Projections
for Hawaii

FROM: Kent M. Keith *Kent M. Keith*

SUBJECT: Recommended Projections for Planning Purposes

DIVISIONS
ECONOMIC DEVELOPMENT DIVISION
ENERGY DIVISION
FOREIGN-TRADE ZONE DIVISION
HAWAII INTERNATIONAL SERVICES AGENCY
LAND USE DIVISION
PLANNING DIVISION
RESEARCH AND ECONOMIC ANALYSIS DIVISION
OFFICES
ADMINISTRATIVE SERVICES OFFICE
HAWAII FILM OFFICE
INFORMATION OFFICE
OCEAN RESOURCES OFFICE
TOURISM OFFICE

This report presents projections of economic and demographic trends and characteristics for Hawaii, 1980 to 2005, recommended for planning purposes.

The report was prepared in response to legislation enacted in 1979 (HRS, 1982 Supp., sec. 201-44), assigning responsibility for "statistics and other information, as to the number, characteristics, needs, and movement of people into, out of, or within Hawaii, including residents, migrants, and visitors ... for purposes of effective state planning, delivery of governmental services, and long-range policy making," to the Director of Planning and Economic Development.

Adoption of these projections by interested agencies and individuals will do much to assure consistency and uniformity in planning efforts.

The projections described in this report replace a now-outdated set published by DPED in March 1978. The earlier series, labeled "II-F", were prepared based on the information available at the time of their publication. Since 1978, however, extensive revisions in the 1975 estimates used as a base and the release of 1980 census results and related intercensal and postcensal economic and demographic statistics have underscored the advisability of making a new study. Although these new projections, termed "M-F", do not differ radically from the 1978 set, they introduce many refinements into the underlying details, and moreover carry the time horizon an additional five years, to 2005.

I wish to stress that these projections represent expected trends and not economic or population goals. They are not to be confused with the State Administration's broad objective of moderating or stabilizing growth rates through orderly management. No effort has been made to introduce value judgments in making projections to reflect the desired level of population and economic activities.

Obviously, there will be further changes, as new trends emerge and new data sources and methods of analysis become available. Until then, however, these projections should be useful to all who must plan for Hawaii's future and must rely on carefully prepared economic and population projections.

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1. SUMMARY

In 1978, the Research and Economic Analysis Division of the Hawaii Department of Planning and Economic Development constructed the Long-Range Population and Economic Projection and Simulation Model. The model was used to forecast population, employment, and income to the year 2000 under alternative assumptions regarding the future growth of the visitor industry. The "most likely" outlook for tourism resulted in the II-F population projections, which indicated 1,225,900 residents in Hawaii by 2000.

During the past year, the Research and Economic Analysis Division has analyzed the performance of the Hawaii model in the light of results from the 1980 census. This study has led to a reformulation of the model and an updated set of projections.

According to the new forecasts (series M-F), which are recommended for planning purposes, resident population in Hawaii will increase by 35.2 percent over the next 25 years, rising from 969,000 in mid-1980 to 1,310,000 in 2005 averaging a 1.2 percent per year growth rate (table 1). About two-fifths of the population increase will stem from the migration of people into the State. De facto population which includes visitors present but excludes residents absent is projected to increase from 1,055,900 in mid-1980 to 1,501,000 by 2005.

Employment opportunities are expected to increase at about the same rate as population (figure 1). The total number of jobs will grow by 32.9 percent from 499,500 in 1980 to 663,900 in 2005. This implies that there will continue to be about one job for every two State residents.

Table 1.-- SUMMARY OF STATE POPULATION AND ECONOMIC PROJECTIONS: 1980 TO 2005

[Series M-F]

Variable	Estimated	Projections				
	1980	1985	1990	1995	2000	2005
Resident population (1,000)	969.0	1,057.8	1,138.4	1,211.5	1,267.8	1,310.0
De facto population (1,000)	1,055.9	1,166.4	1,277.5	1,373.0	1,447.2	1,501.0
Total jobs (1,000) <u>1/</u>	499.5	529.0	572.3	613.4	644.5	663.9
Agriculture	11.5	11.1	11.0	10.6	10.2	9.8
Manufacturing	23.8	22.8	23.0	23.4	23.4	23.4
Nonmanufacturing	287.9	310.5	345.2	378.3	403.4	418.4
Government <u>1/</u>	147.4	152.7	158.1	163.4	167.7	171.2
Self-employed	28.9	32.0	34.9	37.7	39.8	41.1
Personal income (\$ 1980 millions) .	9,862.0	11,127.8	12,896.3	14,774.3	16,611.9	18,336.8
Per capita personal income (\$ 1980)	10,188	10,520	11,328	12,195	13,103	13,998
Gross State Product (\$ 1980 millions)	11,336.2	12,106.4	14,061.8	16,192.3	18,264.4	20,180.8

1/ Includes military jobs.

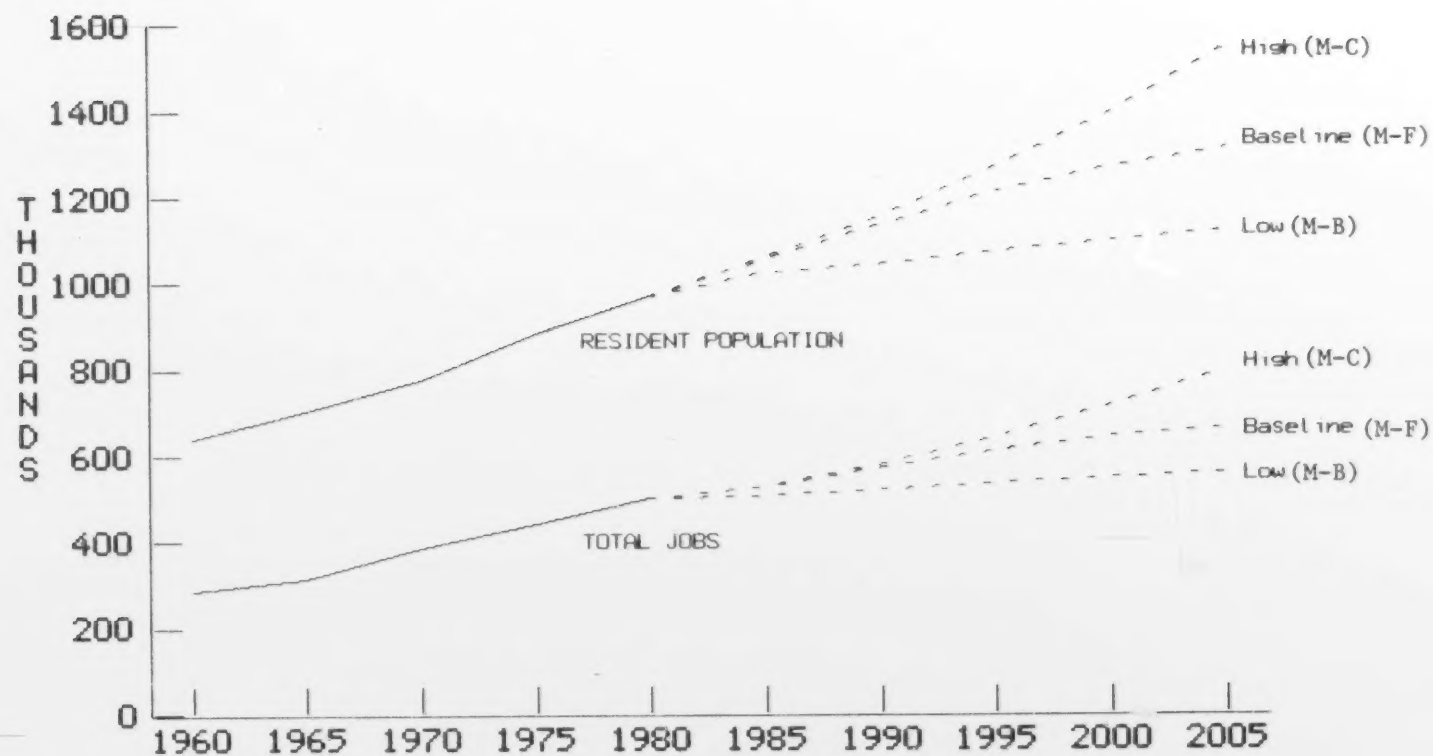


Figure 1.-- ALTERNATIVE HAWAII STATE POPULATION AND JOBS FORECASTS: 1960-2005

[Thousands]

As in the past, most of the new jobs will be found in the nonmanufacturing and service sectors of the economy. The number of jobs in trade, services, and other nonmanufacturing industries will increase by more than 100,000 during the next 25 years.

State personal income, when adjusted for inflation, will nearly double between 1980 and 2005. On a per capita basis, personal income will increase by 37 percent, from \$10,188 in 1980 to \$13,995 (in 1980 dollars) in 2005.

Regarding the geographical incidence of future growth, whether measured in terms of population, employment, or income, the Neighbor Islands will increase at faster rates than Oahu (table 2). Maui and Kauai will witness the highest growth rates. Maui's population, which was 71,900 in 1980, will grow at an average annual rate of 2.6 percent, reaching 135,700 by 2005. The number of jobs on Maui will climb from 33,700 in 1980 to 66,300 in 2005, while personal income will increase from \$0.6 to \$1.9 billion (in 1980 dollars). The population of Kauai, with the second highest growth rate at 2.5 percent, will increase from 39,300 to 72,200. Between 1980 and 2005, the Kauai economy will add 15,200 new jobs and increase personal income by \$0.5 billion. Population growth in Hawaii County will average 1.9 percent, with the number of residents rising from 92,800 to 147,600 during the 25-year period. The number of jobs will climb from 36,600 to 57,900, while personal income will increase from \$0.8 to \$1.7 billion.

Although Oahu will grow at the slowest pace, its absolute gains in population, employment, and income will be the greatest. Of the approximately 340,000 new residents expected for the State, Oahu will account for about 190,000, pushing its resident population to 954,500 by 2005. Nearly three out of every five jobs created during the next 25

Table 2.-- SUMMARY OF POPULATION AND ECONOMIC PROJECTIONS BY COUNTIES: 1980 TO 2005

[Series M-F]

County and variable	1980	1985	1990	1995	2000	2005
Honolulu:						
Resident population (1,000)	765.0	815.3	859.3	896.9	925.7	954.5
De facto population (1,000)	823.7	883.4	941.1	985.2	1,018.2	1,052.1
Total jobs (1,000)	411.7	426.7	452.4	475.9	493.3	506.8
Personal income (\$ 1980 millions) .	8,107.0	8,900.7	10,123.8	11,398.6	12,655.6	13,943.3
Per capita personal income (\$ 1980)	10,599	10,917	11,781	12,709	13,671	14,608
Hawaii:						
Resident population (1,000)	92.8	109.7	122.6	134.4	143.2	147.6
De facto population (1,000)	99.3	118.2	135.1	150.6	163.1	168.6
Total jobs (1,000)	36.6	40.8	46.6	52.1	56.3	57.9
Personal income (\$ 1980 millions) .	771.0	918.1	1,115.0	1,324.7	1,523.7	1,676.3
Per capita personal income (\$ 1980)	8,326	8,369	9,095	9,856	10,640	11,357
Kauai:						
Resident population (1,000)	39.3	46.0	55.1	63.9	69.1	72.2
De facto population (1,000)	46.3	54.2	66.9	79.3	88.2	92.2
Total jobs (1,000)	17.6	20.0	24.4	28.7	31.3	32.8
Personal income (\$ 1980 millions) .	335.0	407.7	528.5	661.2	769.4	859.3
Per capita personal income (\$ 1980)	8,546	8,863	9,592	10,347	11,135	11,902
Maui County:						
Resident population (1,000)	71.9	86.9	101.4	116.3	129.9	135.7
De facto population (1,000)	86.7	110.6	134.4	157.9	177.7	188.1
Total jobs (1,000)	23.7	41.5	48.8	56.6	63.5	66.3
Personal income (\$ 1980 millions) .	648.0	901.3	1,129.0	1,389.9	1,663.1	1,855.2
Per capita personal income (\$ 1980)	9,088	10,372	11,134	11,951	12,803	13,671

years will be found on Oahu. By 2005, with 506,800 jobs and \$13.9 billion in personal income, Oahu will still support 76 percent of the economic activity in the State.

Future growth throughout the State will depend to a large extent on the health of the visitor industry. If visitor arrivals were to grow at the rate of 5 percent annually to the year 2005 (series M-C), instead of the declining rate assumed in the baseline case as shown in the next chapter (page 23) (series M-F), employment would increase to 797,600 jobs by 2005 (table 3). Improved conditions in the labor market, as reflected by the higher job growth rate, would increase in-migration, causing State resident population to reach 1,544,900 in 2005. Slower growth in tourism would have the opposite effect. Under the extreme assumption of no long-term growth (series M-B), Hawaii would have 102,300 fewer jobs and 190,000 fewer people than projected in the baseline case. Under such economic condition, there will therefore be more out-migration from Hawaii to other states. Lack of job opportunities will also result in high unemployment rate and lack of social mobility, although the dynamic changes in the labor market adjustment process are not explicitly described in the model.

The projections summarized here are discussed in more detail in the following report. However, the report begins with a description of the Hawaii Population and Economic Projection and Simulation Model. Additional information on the model's specification is found in the technical appendices.

Table 3.-- SUMMARY OF ALTERNATIVE STATE POPULATION AND ECONOMIC SIMULATIONS: 1980 TO 2005

Variable	1980	1985	1990	1995	2000	2005
Baseline forecasts (Series M-F)						
Visitor arrivals (1,000)	3,935.0	5,000.0	6,083.3	7,052.2	7,786.2	8,183.4
Resident population (1,000)	969.0	1,057.8	1,138.4	1,211.5	1,267.8	1,310.0
Total jobs (1,000)	499.5	529.0	572.3	613.4	644.5	663.9
Personal income (\$ 1980 millions)	9,862.0	11,127.8	12,896.3	14,774.3	16,611.9	18,336.8
Per capita personal income (\$ 1980) ..	10,188	10,520	11,328	12,195	13,103	13,998
High forecasts (Series M-C)						
Visitor arrivals (1,000)	3,935.0	5,021.0	6,409.0	8,180.0	10,439.0	13,324.0
Resident population (1,000)	969.0	1,059.2	1,155.2	1,267.1	1,393.7	1,544.9
Total jobs (1,000)	499.5	529.7	581.8	645.3	716.6	797.6
Personal income (\$ 1980 millions).....	9,862.0	11,141.0	13,080.2	15,425.7	18,174.5	21,407.2
Per capita personal income (\$ 1980) ..	10,188	10,518	11,323	12,174	13,040	13,857
Low forecasts (Series M-B)						
Visitor arrivals (1,000)	3,935.0	4,357.0	4,357.0	4,357.0	4,357.0	4,357.0
Resident population (1,000)	969.0	1,025.0	1,047.2	1,072.0	1,096.0	1,120.0
Total jobs (1,000)	499.5	510.2	520.8	535.6	549.8	561.6
Personal income (\$ 1980 millions).....	9,862.0	10,791.5	11,899.3	13,173.8	14,546.3	15,973.0
Per capita personal income (\$ 1980) ..	10,188	10,528	11,363	12,289	13,272	14,262

2. HAWAII POPULATION AND ECONOMIC PROJECTION AND SIMULATION MODEL

Model Specification

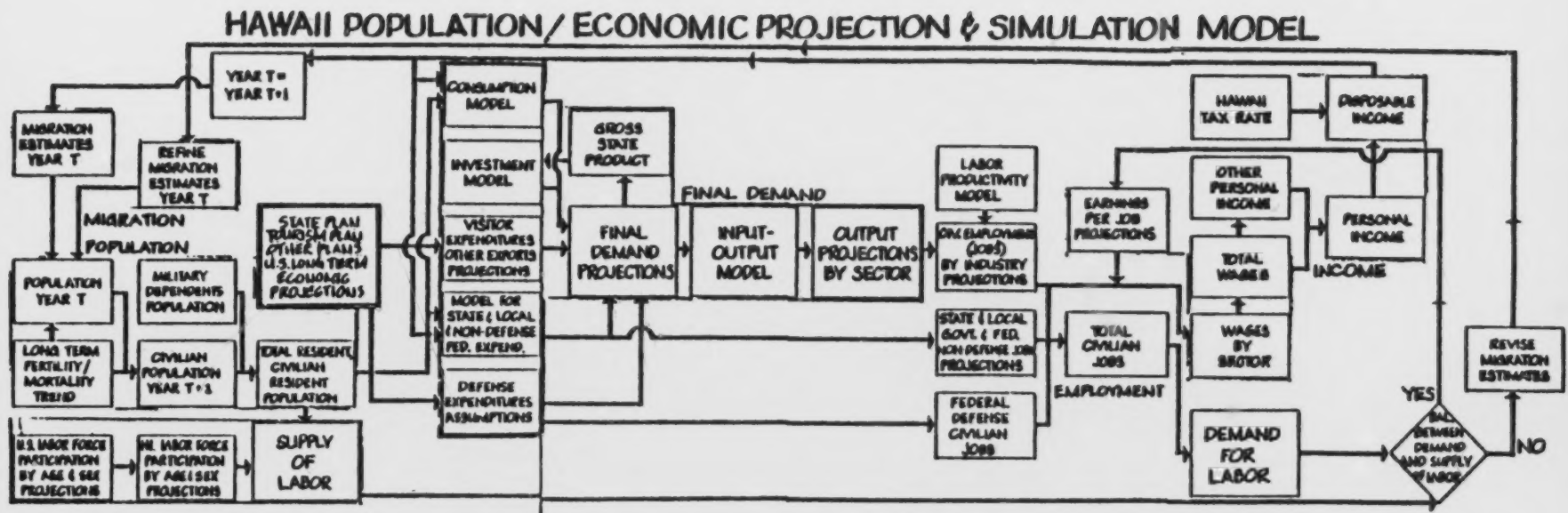
The Hawaii Population and Economic Projection and Simulation Model is, in fact, part of a system of three models designed to give a consistent set of national, state, and county projections. At the center of the system is the Hawaii State model, which forecasts final demand (expenditures), output (production), employment, income, and population (figure 2). Given to the State model are projections of U.S. productivity and wage rates, among other variables, the sources of which are national economic models maintained by UCLA, Data Resources, Inc., and U.S. Bureau of Economic Analysis (BEA). The County model, in turn, allocates the State forecasts of population, employment, and income among Hawaii's four counties.

State Model

Technically speaking, the Hawaii State model is an interindustry econometric model linked to a demographic model, which generates State projections on an annual basis for a 25-year period (table 4).¹ The model is a mathematical representation of the interaction between State demographic and economic activity entailing 198 relationships. Among the 121 demographic variables depicted by the State model are population by age and sex, net migration, births, and deaths. The economic component of the model forecasts output, employment, and income for each of 20 industries. Other predicted economic variables include Gross State Product, personal consumption expenditures, private capital investment, government spending, exports, imports, persons employed, unemployment

¹The forecasting equations constituting the State model are presented in a series of tables in Appendix A.

Figure 2



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Table 4.-- FEATURES OF STATE MODEL

Projection Period

1-25 years

Model Size

198 relationships (equations)
198 predicted (endogenous) variables
100 given (exogenous) variables

Demographic Variables

resident population by age, sex and military status
net migration
births
deaths

Economic Variables

Gross State Product
consumption
investment
government expenditures
visitor expenditures and other exports by industry
imports
output by industry
employment by industry
persons employed
unemployment rate
labor force
income by industry
personal income
disposable income
per capita personal income

rate, labor force, personal income, personal income taxes, disposable income, and per capita personal income.

In spite of the State model's large size, its logical structure is simple, being derived from the economic base theory of regional growth. Referring to figure 2, exports, one of the components of final demand, are considered to be the fundamental determinant of State economic activity. In the lexicon of regional economics, exports are defined to include foreign exports, exports to the rest of the United States, and sales to the Federal government. In Hawaii, tourism, Federal defense, and pineapple and sugar processing are the three principal exports sectors that bring income into the State. According to the economic base theory, national economic conditions largely determine the level of regional export production. In particular, exports are forecast on the basis of national market demands, as represented by such variables as U.S. personal income, and the degree to which the region can meet these demands. In the case of Hawaii, the projections of external sales are also based on specific agricultural commodity analyses and policies of the Hawaii State Plan, especially regarding visitor industry development.

Export production, in turn, triggers the first set of internal economic demands, to so-called interindustry demands. For example, in supplying the needs of tourists, the eating and drinking places industry requires goods and services that affect the output of the food processing and business services industries. The induced production in these industries establishes additional intermediate demands, all of which are depicted by relations in the output component of the State model. This input-output submodel which measures the responding or multiplier process is the core of the State model.

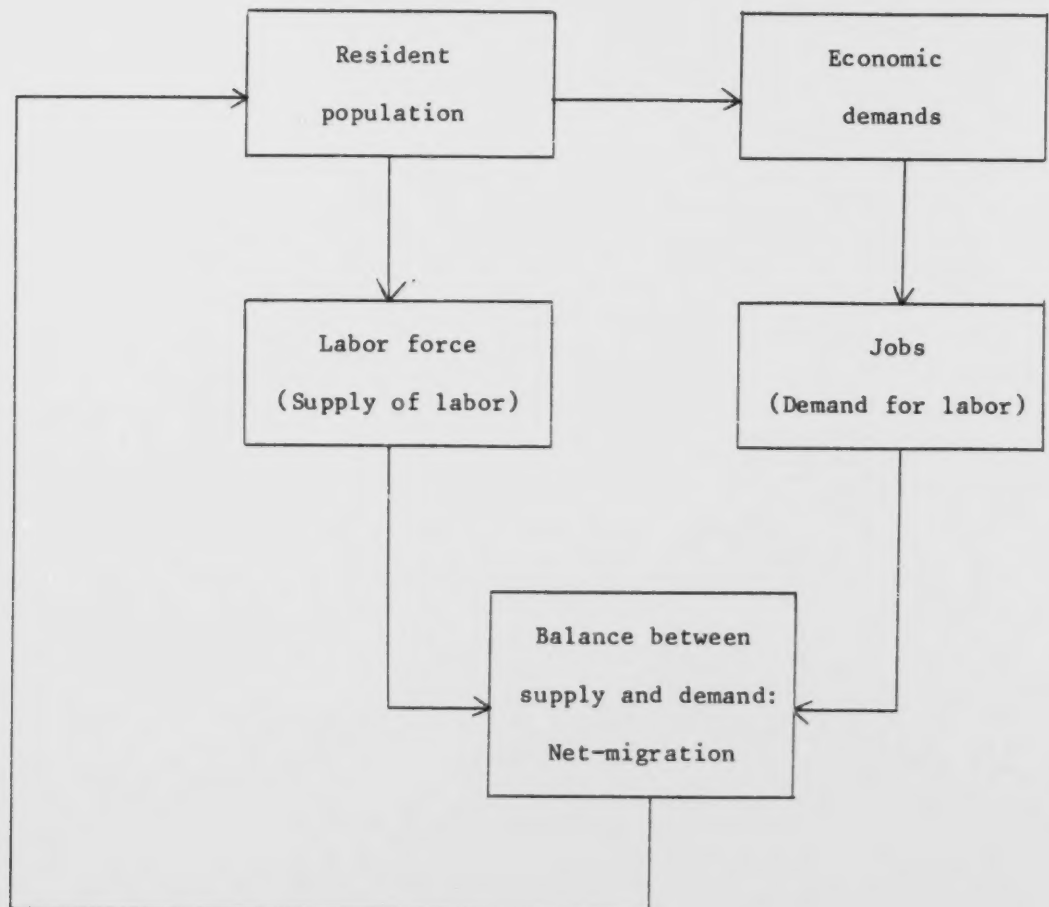
Forecasts of industrial output then lead to predictions of jobs, population, and income. Output and changes in labor productivity, the latter being projected from national trends, combine to project jobs in each industry and the total number of persons employed in the economy. Through linkages with the demographic submodel, forecasts of persons employed, labor force participation, labor force, and net migration result in a projection of resident population. In the course of production, labor earns income, primarily in the form of wages and salaries. For each private and public sector, local earnings are related to U.S. wage rates. Separate relations predict other components of personal income, personal income taxes, and disposable income.

Finally, disposable income and population become key factors that explain the second set of internal demands: personal consumption, private investment, and State and local government expenditures. Consumer spending is forecast from household income and the relative prices of goods and services. Private construction is related to population, per capita income and Gross State Product.

Elaborating upon the relationships among demographic and economic variables in the State model (figure 3), population and economic activity interact in two fundamental ways. On the one hand, population affects the demand for goods and services. On the other, local production indirectly affects population through the demand for labor.

Regarding the first interaction, a change in population alters the demand for consumer goods, housing, and public services. As for the second interaction, the major economic force influencing population manifests itself through its effect on migration. The Hawaii State model postulates that differences between the demand and supply of labor are

Figure 3.-- RELATIONSHIP BETWEEN EMPLOYMENT AND POPULATION



eliminated by an adjustment in the rate of migration. In other words, economic growth resulting in new jobs and a shortage of labor, as reflected by low unemployment and high average earnings, induces migration into the area, whereas a loss of jobs causes an outflow of people.

The detailed demographic submodel follows the traditional cohort-component method, forecasting population change by separately predicting births, deaths, and net migration for the civilian population.² The projection procedure starts with estimates of resident population by age, sex, and military status from the base year. The projected surviving population is found by applying the appropriate birth and death rates to each category of the previous year's civilian population. A projection of the civilian labor force participation rate, when combined with an estimate of the surviving population, yields the predicted surviving labor force. The demand for labor in Hawaii is determined by the number of jobs projected by the economic submodel and an assumed long-term unemployment rate. Net migration then becomes the number of new residents required to provide the labor force that when added to the surviving labor force equals the demand for labor. The projected resident population is the sum of the surviving civilian population, net migration, and military and dependent population. Finally, the total resident population is converted to corresponding de facto values. The de facto population which includes all persons physically present is calculated by adding the average number of visitors present to the resident total, then subtracting the average number of residents out of State.

²Appendix B elaborates on the demographic submodel of the State model.

County Model

Given the State forecasts of population, employment, and income, the County model in effect distributes them among the four counties. The County model has less detail than the State model, forecasting only 19 variables for each county (table 5). Among the projected variables are resident population, jobs, and personal income. Employment is forecast for 16 job categories.

The County model makes a distinction between industries that primarily produce exports, such as agriculture and the visitor industry, and industries that primarily serve the local population, such as construction and trade.³ With the exception of eating and drinking places and hotels, employment in each export industry is forecast as a share of employment in the corresponding State industry (figure 4). In keeping with the expectations of the Hawaii State Tourism Functional Plan, predictions of eating and drinking places and hotel employment are based on projections of the planned number of hotel rooms in each county. Employment in the locally-oriented industries is forecast from total employment in the export industries. Forecasts of county population and personal income are then derived from projections of total employment.

Past Performance

The Hawaii Population and Economic Projection and Simulation Model has been in operation for six years, which is a history of sufficient length to assess its capabilities as a forecasting method. Table 6 summarizes the State and county predictions for 1980, which were prepared

³See Appendix C for a technical presentation of the County model.

Table 5.-- FEATURES OF COUNTY MODEL

Projection Period

1-25 years

Model Size

76 relationships (equations)
76 predicted (endogenous) variables
24 given (exogenous) variables

Demographic Variables by County

resident population

Economic Variables by County

employment by industry
personal income
per capita personal income

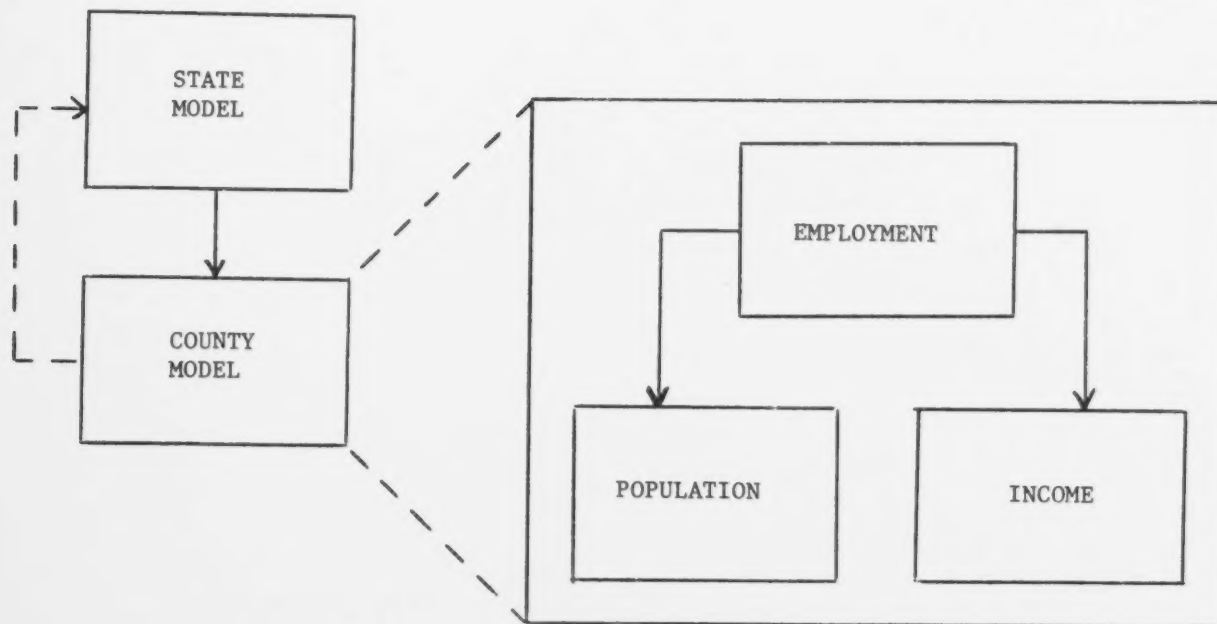


Figure 4.-- STRUCTURE OF COUNTY MODEL

Table 6.-- FORECASTING ERRORS FOR 1980: UNREVISED DATA

Variable	Unrevised estimate 1975	Unrevised projection 1980	Estimate 1980	Percent error
STATE				
Resident population (1,000) ...	868.4	942.3	969.0	-2.8
Civilian labor force (1,000) ..	365.3	399.6	439.0	-9.0
Civilian persons employed ...	337.1	377.6	417.0	-9.4
Civilian persons unemployed .	28.2	22.0	22.0	0
Unemployment rate (percent)	7.7	5.5	5.0	+10.0
Total jobs (1,000)	434.6	479.8	499.5	-3.9
Agriculture	10.0	9.6	11.5	-16.5
Manufacturing	23.8	23.8	23.8	0
Nonmanufacturing	233.2	267.4	287.9	-7.1
Government, civilian	82.2	91.7	89.0	+3.0
Government, military	58.8	58.8	58.4	+0.7
Self-employed	26.6	28.5	28.9	-1.4
Personal income (millions of 1975 dollars)	5,674.0	6,825.3	6,689.8	+2.0
Per capita personal income (1975 dollars)	6,533.9	7,243.3	6,910.9	+4.8
COUNTIES				
Resident population (1,000):				
Honolulu	705.4	753.7	765.0	-1.5
Hawaii	75.3	84.7	92.8	-8.7
Kauai	32.7	36.5	39.3	-7.1
Maui	55.0	67.4	71.9	-6.2
Total jobs (1,000):				
Honolulu	365.7	397.3	411.7	-3.5
Hawaii	31.5	36.5	36.6	-0.3
Kauai	13.8	16.1	17.6	-8.5
Maui	23.6	29.9	33.7	-11.3

Source: Present study.

in 1978 with a model estimated with data through 1975. Comparing predicted with actual values, the model forecasts population in 1980 on the low side, not only for the State but for each of the counties. The forecasting error for the State is -2.8 percent. Reflecting the forecasting law that the parts are more difficult to predict than the whole, the county forecasting errors tend to be higher in absolute terms, ranging up to -8.7 percent in the case of the County of Hawaii. The model also underpredicts the growth of jobs, the error in total State jobs being -3.5 percent. In contrast, the 1980 forecast of personal income overshoots the mark by +2.0 percent.

Part of the forecasting error is attributable to revisions in the 1975 data. For example, a major revision occurred with the population series as a result of the 1980 census. The census showed that State population estimates made during the late 1970s were below their actual levels. Using the unrevised 1975 population estimate shown in table 6, the Hawaii model predicts an 8.5 percent gain in State population between 1975 and 1980. If this growth rate is applied to the revised population estimate for 1975, reported in table 7, the 1980 resident population forecast becomes 959,200, which is only 1.0 percent below the actual number recorded by the census. The use of revised data generally reduces the prediction errors of both the demographic and economic variables to fairly small sizes.

While the model does a reasonably good job of forecasting the growth of population and personal income between 1975 and 1980, closer examination reveals that this accuracy stems in part from compensating errors. A low projection of nonmanufacturing jobs, and thus total employment, combines with a low projection of labor force participation

Table 7.-- FORECASTING ERRORS FOR 1980: REVISED DATA

Variable	Revised estimate 1975	Revised projection 1980	Estimate 1980	Percent error
STATE				
Resident population (1,000) ..	884.0	959.2	969.0	-1.0
Total jobs (1,000)	439.7	485.4	499.5	-2.8
Personal income (millions of 1975 dollars)	5,786.0	6,960.0	6,689.8	+4.0
Per capita personal income (1975 dollars)	6,545.2	7,256.0	6,910.9	+5.0
COUNTIES				
Resident population (1,000) ..				
Honolulu	714.3	763.2	765.0	-0.2
Hawaii	78.1	87.8	92.8	-5.4
Kauai	34.1	38.1	39.3	-3.1
Maui	57.5	70.5	71.9	-1.9

Source: Present study.

to give an accurate forecast of population. The low labor force participation projection also offsets a high average earnings projection, leading to a modest +2.0 percent error for personal income. Like the national forecasts produced at the same time, the Hawaii predictions fail to reflect three related developments during the late 1970s: little gain in labor productivity, especially for the nonmanufacturing sector; a leveling off of real wage rates; and a sharp rise in labor force participation.

Modifications of the Model

The assessment of its past performance has led to modifications of the Hawaii Population and Economic Projection and Simulation Model. Three types of changes have been made: (1) extension and revision of the data base used to calibrate the model; (2) reformulation of the model; and (3) new assumptions regarding future trends in fertility, mortality, labor force participation, productivity, and earnings.

(1) Data base. The data series needed to calibrate the model have been extended to incorporate the most recent information. This task has included updating the State input-output model to 1980, which permits the Hawaii model's base-year (the year prior to the first forecast year) to advance from 1975 to 1980. The data series have also been revised where necessary. As previously noted, the historical estimates of population have been raised substantially to be consistent with the 1980 census counts. The labor force, employment, and income data also have been revised.

(2) Reformulation of the model. Selected components of the model have been reformulated with the purpose of improving its forecasting capabilities. The submodel linking demographic and economic activity has

been re-specified to depict both the short- and long-term relationships among changes in employment, labor force, unemployment, net migration, and population. Visitor expenditures have also been separated into two categories, acknowledging the fact that visitors from Japan have different spending patterns than visitors from other areas. Finally, there have been changes in the part of the model that forecasts county activity. It now projects personal income by county. In addition, the growth of the visitor industry in each county, as reflected by the number of jobs in hotels and eating and drinking places, takes into account the planned number of hotel rooms.

(3) New assumptions. The fertility and mortality rates were revised based on new national projections prepared by the U.S. Bureau of the Census in 1982. The revised data assume lower fertility rates and longer life expectancy. The other new assumption of consequence deals with labor force participation. Compared with the 1977 outlook, a greater fraction of the population is expected to enter the labor force. This implies that more employment is needed to support a given level of population.

The persistent slump in productivity and real earnings during the past ten years has lowered the long-term projections for output per job and real wage rates, which are critically important assumptions underlying the forecasts of the Hawaii model. The significance of these changes is apparent in the resulting projection of constant-dollar per capita income. The forecast made in 1977 called for a long-term annual growth rate of 2.4 percent, whereas the current expectation is 1.3 percent. While per capita income is affected significantly by changes in productivity and earnings, employment is not in this case. Lower productivity in the future means more jobs per unit of output. But lower earnings mean smaller income and thus less demand for output and jobs.

3. UPDATED PROJECTIONS

Statewide Projections

Economic Projections

Except for the assumptions regarding productivity, earnings, fertility, mortality, and labor force participation, the assumptions leading to the updated set of projections remain generally unchanged since the forecasts made in 1978:

(1) Visitor arrivals are expected to grow but at a declining annual rate (see table 15, page 37 for visitor industry projections):

1980-1985	5 percent
1985-1990	4 percent
1990-1995	3 percent
1995-2000	2 percent
2000-2005	1 percent

(2) Federal defense expenditures in constant dollars will increase 2 percent per year.

(3) The value of sugar and pineapple production is assumed to remain constant. However, because of technological improvements, employment in these industries is expected to decline by 40 percent between 1980 and 2005.

(4) Other agricultural exports will grow at rates based on sales projections of the agricultural commodities.

Table 8 shows the net effect of these assumptions on Hawaii exports. Total exports (including federal defense expenditures), measured in constant dollars, are expected to increase nearly 80 percent between 1980 and 2005. The annual growth rate for exports will average 2.4 percent over the next 25 years. However, because of the slowdown in visitor expenditures, growth will be faster in the earlier years than the later

Table 8.-- EXPORT PROJECTIONS: 1980 TO 2005

[Series M-F; millions of 1980 dollars]

Variable	1980	1985	1990	1995	2000	2005
Total	6,853.2	7,643.3	8,920.8	10,160.5	11,291.3	12,253.2
Visitor expenditures	2,888.2	3,669.7	4,477.4	5,190.5	5,730.6	6,022.9
Other exports	2,239.5	2,068.6	2,340.0	2,647.7	2,996.7	3,399.5
Sugarcane	572.1	270.0	260.0	250.0	250.0	250.0
Pineapple	201.8	161.4	167.4	169.4	171.4	173.4
Other agriculture and manufacturing	509.6	547.7	587.1	637.7	692.0	760.4
Transportation and warehousing ..	577.9	653.8	797.7	924.7	1,031.8	1,084.4
Miscellaneous exports	378.1	435.7	527.8	665.9	851.5	1,131.3
Federal defense expenditures	1,725.5	1,905.0	2,103.4	2,322.3	2,564.0	2,830.8

Source: Present study.

years. For example, between 1985 and 1990, the growth rate will average 3.1 percent per year, compared to 1.6 percent between 2000 and 2005. Of the \$5.4 billion (1980 dollars) gain in exports, visitor expenditures will account for \$3.1 billion, increasing its share of total exports from 42 percent in 1980 to 49 percent in 2005.

The increase in visitor expenditures will contribute to the creation of 17,400 jobs in eating and drinking places and 12,300 jobs in hotels and lodging, the two major sectors comprising the tourism industry (table 9). Although exports in the other sectors will also expand, increases in labor productivity will at least match the growth. Military employment is forecast to stay at its 1980 level of 58,400 jobs throughout the forecast period. Agriculture and food processing are expected to lose 2,900 jobs, causing their share of total employment to drop from 4.6 percent in 1980 to 3.0 percent in 2005.

Taking into account the jobs supported by the export jobs through the economy's responding (multiplier) process, Hawaii will add a total of 164,400 jobs during the 25-year period. The employment growth rate will average 1.1 percent per year, which will be down dramatically from the 2.8 percent rate that prevailed between 1960 and 1980 (table 10).

Nevertheless, State jobs will grow at about the same pace as jobs in the U.S. economy, according to a long-term forecast by Data Resources, Inc.

Most of the new jobs will be found in trade and services. Including eating and drinking places and hotels, trade and services will add 103,200 jobs, accounting for almost two-thirds of the State's jobs created in the next 25 years. Federal, State, and local government will provide another 23,800 jobs, construction and finance, insurance, and real estate will contribute about 17,200, and miscellaneous manufacturing and transportation, communication, and utilities will add 10,600 more jobs.

Table 9.-- ECONOMIC PROJECTIONS: 1980 TO 2005

[Series M-F]

Variable	1980	1985	1990	1995	2000	2005
Civilian labor force (1,000)	439.0	488.4	533.4	575.6	607.9	627.7
Persons employed	417.0	461.5	503.9	544.2	574.7	593.7
Persons unemployed	22.0	26.9	29.5	31.4	33.2	34.0
Unemployment rate (percent)	5.0	5.5	5.5	5.5	5.5	5.5
Total jobs (1,000)	499.5	529.0	572.3	613.4	644.5	663.9
Armed forces	58.4	58.4	58.4	58.4	58.4	58.4
Civilian jobs	441.1	470.6	513.8	554.9	586.1	605.4
Self-employed	28.9	32.0	34.9	37.7	39.8	41.1
Wage and salary jobs by sector .	412.2	438.6	478.9	517.3	546.3	564.3
Agriculture	11.5	11.0	11.1	10.6	10.2	9.8
Sugarcane	4.8	4.0	3.6	3.2	2.8	2.6
Pineapple	2.5	2.1	2.0	1.9	1.8	1.7
Other agriculture	4.2	4.9	5.5	5.5	5.6	5.6
Food processing	11.5	11.1	11.0	10.8	10.5	10.3
Sugar processing	3.8	3.4	3.1	2.8	2.5	2.3
Pineapple	3.3	2.5	2.3	2.1	1.9	1.8
Other	4.4	5.2	5.6	5.9	6.1	6.2
Miscellaneous manufacturing ..	12.2	11.7	12.1	12.6	12.9	13.1
Construction	24.1	21.2	23.4	25.8	27.7	28.9
Transportation, communication, and utilities	30.9	32.1	35.5	38.3	40.2	40.6
Transportation	21.2	21.7	24.5	26.8	28.3	28.6
Communication	7.1	7.8	8.3	8.7	8.9	9.0
Utilities	2.6	2.5	2.7	2.8	3.0	3.0

Continued on next page.

Table 9.-- ECONOMIC PROJECTIONS: 1980 TO 2005 -- Con.

Variable	1980	1985	1990	1995	2000	2005
Trade (exc. eating & drinking)	71.0	76.3	85.6	94.9	102.1	108.2
Wholesale	18.7	20.3	21.9	23.4	24.4	24.9
Retail (exc. eating & (drinking)	52.3	56.0	63.7	71.4	78.2	83.4
Eating and drinking places ...	34.5	39.1	43.6	47.8	50.6	51.9
Finance, insurance, and real estate	31.1	33.7	36.8	39.7	41.9	43.5
Hotels	24.8	28.3	31.8	35.0	36.9	37.1
Other services	71.7	79.9	88.4	96.8	103.5	108.0
Health & professional services	40.9	45.5	50.4	55.2	59.2	62.4
Other services	30.8	34.3	38.0	41.6	44.2	45.7
State and local government ...	59.0	62.0	66.6	71.1	74.6	77.4
Federal government	30.0	32.3	33.1	33.9	34.7	35.4
Gross State Product (millions of 1980 dollars)	11,336.2	12,106.4	14,061.8	16,192.3	18,264.4	20,180.8
Personal income (millions of 1980 dollars)	9,862.0	11,127.8	12,896.3	14,774.3	16,611.9	18,336.8
Disposable income (millions of 1980 dollars)	8,385.0	9,514.3	11,026.3	12,632.0	14,203.1	15,678.0
Per capita personal income (1980 dollars)	10,188	10,520	11,328	12,195	13,103	13,998

Note: Totals may not add due to rounding of figures.

Source: Present study.

Table 10.-- HAWAII AND UNITED STATES POPULATION AND ECONOMIC FORECASTS: 1980 TO 2005

Subject	1960	1980	2005	Annual growth rate (%)	
				1960-1980	1980-2005
Hawaii (series M-F)					
Resident population (1,000)	641.5	969.0	1,310.0	2.1	1.2
Total jobs (1,000)	287.3	499.5	663.9	2.8	1.1
Personal income (\$ 1980 millions) .	3,556.6	9,862.0	18,336.8	5.2	2.5
Per capita personal income (\$ 1980)	5,544	10,188	13,998	3.1	1.3
United States					
Resident population (million)	180.7	227.6	275.6	1.2	0.8
Total jobs (million) 1/	65.8	99.3	134.2	2.1	1.2
Personal income (\$ 1980 billions) .	1,001.8	2,165.3	3,968.1	3.9	2.5
Per capita personal income (\$ 1980)	5,544	9,514	14,398	2.7	1.7

^{1/} Civilian persons employed.

Source: Hawaii from present study; United States from Data Resources, Inc., "DRI U.S. Long-Term Review," Spring 1983.

When adjusted for inflation, Hawaii's Gross State Product is projected to increase by 78 percent between 1980 and 2005, rising from \$11.3 to \$20.2 billion (in 1980 dollars). Personal income with a growth rate of 2.5 percent per year will grow by a similar amount -- from \$9.9 billion in 1980 to \$18.3 billion in 2005. On a per capita basis, income will rise by 1.3 percent annually, which is considerably below the historical rate and somewhat less than the 1.7 percent national rate. The slower growth in per capita income reflects the relatively smaller gains in productivity, wage rates, and labor force participation forecast in the future.

Population Projections

Eighteen separate series were computed, using various economic and demographic scenarios. Low (L), medium (M) and high (H) fertility assumptions were paired with three separate migration assumptions. One, designated 0, assumed zero net migration among civilians other than military dependents. The second allowed for an annual net in-migration of 5,000 such civilians, and the third provided for 10,000 annually. (For comparison, the annual averages were 5,200 in the 1960s, 10,600 in the 1970s, and 8,200 for 1980-1983.) The nine demographic simulations thus calculated were designated L-0, M-5, H-10, etc.

The nine projections which incorporate the economic model combined the same three fertility assumptions with each of three hypothetical tourism scenarios. One (termed B, for comparability with the 1978 DPED study) assumed no increase in visitor arrivals after 1983. The second (F) assumed a gradual decline in annual rates of increase (page 23). The last (C) postulated an annual increase of 5 percent in arrivals, compounded to 2005. These illustrative projections were designated L-B, M-F, H-C, etc.

The 18 series thus calculated indicated a resident population in 2005 ranging from 1,101,000 (series L-0) to 1,586,200 (series H-C), as compared with the 1980 mid-year base estimate of 969,000. The assumptions, corresponding to those recommended for planning purposes in the earlier DPED study, produced a 2005 projection of 1,310,000 for this current study. In the strictly demographic projections, the future values were far more influenced by the level of net migration than by future fertility. In the economic projections, which incorporate the economic model, the assumption regarding tourism trends tended to swamp the effect of differential fertility.

These simulations indicate that, even under the most conservative assumptions, a significant degree of population growth over the next two decades can be expected. Low fertility and zero net in-migration would still produce an increase of 13.6 percent between July 1980 and July 2005. Low fertility in combination with stagnant tourism growth (that is, visitor totals held constant after 1983) would similarly raise population by the same percent over the quarter-century.

A much more likely scenario, involving an intermediate fertility rate, migration levels somewhat below those of the recent past, and a moderate, slowly declining rate of increase in visitor arrivals, results in a noticeably more vigorous growth in the resident population. If annual civilian net in-migration remains unchanged at 5,000 (the 1975-1983 average exceeded 8,000), the population in 2005 will be 32 percent above the 1980 total. The "most likely" tourism assumption, in combination with medium fertility, leads to a 25-year population growth of 35.2 percent.

Even higher levels of fertility, migration and tourism growth -- somewhat above those of the past decade but still well within the realm of possibility -- would by contrast push population far above recent

estimates. A continued net in-migration of 10,000 annually would raise the total 52.7 percent over the 1980 mid-year total. Steady increases of five percent in visitor arrivals (series H-C) would result in a 25-year population growth of 63.7 percent.

All 18 series are reproduced in table 11.

Although these varied assumptions lead to widely differing population totals for 2005, they have surprisingly little impact on the age and sex structure of the population. A comparison of eight of the combinations shows that all produce a continued decline in the proportion of residents under 15 years of age, a sharp rise in the percentage 65 and over, significant rises in the median age, and a further reduction in the sex ratio. Variations from one series to another are quite small.

Comparisons are presented in table 12. A more detailed breakdown for series M-F, recommended the most likely for planning purposes, appears in table 13.

The components of population change implicit in each of the scenarios would of course differ appreciably from one another. These variations would be greatest for net migration, least for mortality, and moderate for births. A comparison of eight series, reported in table 14, shows net migration over the 25 years ranging from -200 annually in series M-B to +14,100 in M-C; in the former case, migration would account for -3.3 percent of overall change, as against +61 percent in the latter case. The recommended projection, series M-F, averages 15,300 births annually, 7,500 deaths, and 5,800 net in-migration. Although births would remain relatively constant over the quarter of a century, deaths would increase noticeably (from 5,200 in the early 1980s to 9,600 after 2000) and net in-migration would drop off (from 8,500 to 2,500).

Table 11.-- ALTERNATE PROJECTIONS OF TOTAL RESIDENT POPULATION: 1985 TO 2005

Series <u>1/</u>	1985	1990	1995	2000	2005
Demographic projections:					
L-0	1,012,300	1,047,300	1,072,800	1,090,200	1,101,000
L-5	1,038,400	1,101,900	1,157,600	1,206,400	1,249,500
L-10	1,064,400	1,156,400	1,242,500	1,322,600	1,398,000
M-0	1,013,700	1,052,200	1,083,200	1,108,100	1,127,400
M-5	1,039,800	1,107,000	1,168,900	1,226,200	1,279,300
M-10	1,065,900	1,161,900	1,254,600	1,344,300	1,431,100
H-0	1,015,400	1,058,900	1,097,700	1,133,700	1,166,100
H-5	1,041,600	1,114,100	1,184,600	1,254,500	1,322,900
H-10	1,067,800	1,169,300	1,271,500	1,375,500	1,479,800
Economic projections:					
L-B	1,023,600	1,042,300	1,062,500	1,081,400	1,101,200
L-F	1,056,400	1,133,100	1,200,600	1,250,300	1,289,000
L-C	1,057,700	1,149,800	1,255,800	1,374,700	1,518,600
M-B	1,025,000	1,047,200	1,072,000	1,096,000	1,120,000
M-F	1,057,800	1,138,400	1,211,500	1,267,800	1,310,000
M-C	1,059,200	1,155,200	1,267,100	1,393,700	1,544,900
H-B	1,026,900	1,053,900	1,085,300	1,117,200	1,147,900
H-F	1,059,800	1,145,700	1,226,800	1,293,200	1,343,600
H-C	1,061,100	1,162,500	1,283,000	1,423,100	1,586,200

1/ Capital letters L, M, and H designate fertility assumptions (L, low; M, medium; H, high). Arabic numbers designate migration assumptions, in thousands of net in-migrants annually. Capital letters B, F, and C designate tourism assumptions (B, no growth in visitor arrivals from 1983; F, annual increases in visitors declining from approximately 5 percent in 1980-1985 to 1 percent in 2000-2005; C, annual increases in visitors constant at 5 percent, 1980 to 2005).

Table 12.-- AGE AND SEX PROJECTIONS BASED ON VARIOUS ASSUMPTIONS:
1960 TO 2005

Year and series	Population by age			Percent by age			Median age (years)	Males per 100 females
	Under 15	15 to 64	65 & over	Under 15	15 to 64	65 & over		
1960 ...	217,758	385,852	29,162	34.4	61.0	4.6	24.3	114.8
1970 ...	230,459	493,986	44,116	30.0	64.3	5.7	25.0	108.1
1980 ...	225,775	662,766	76,150	23.4	68.7	7.9	28.3	105.2
2005:								
L-F ..	244,600	866,700	177,800	19.0	67.2	13.8	35.5	101.4
M-F ..	265,700	866,900	177,300	20.3	66.2	13.5	34.7	101.5
H-F ..	297,600	869,200	176,800	22.1	64.7	13.2	33.7	101.7
M-O ..	226,300	737,500	163,500	20.1	65.4	14.5	35.0	101.9
M-5 ..	258,600	846,600	174,000	20.2	66.2	13.6	34.6	101.6
M-10 .	291,000	955,600	184,500	20.4	66.8	12.9	34.3	101.2
M-B ..	224,200	732,700	163,100	20.0	65.4	14.6	34.9	101.9
M-C ..	314,600	1,040,900	189,400	20.4	67.4	12.2	33.7	101.1

Source: 1960, 1970 and 1980 from U.S. Bureau of the Census, General Population Characteristics, Hawaii for 1960, 1970 and 1980; projections from present study.

Table 13.-- RESIDENT POPULATION PROJECTIONS BY AGE AND SEX: 1980 TO 2005

[Series M-F]

Age in years	1980 (est.)			1985			1990		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Total ..	968.0	496.6	471.4	1,057.8	539.9	517.9	1,138.4	578.5	560.0
0 to 4	77.2	39.7	37.6	85.1	43.6	41.5	89.4	45.7	43.6
5 to 9	73.6	38.0	35.6	78.1	40.3	37.7	83.4	43.0	40.4
10 to 14	75.0	38.8	36.2	74.9	38.5	36.4	78.1	40.1	38.0
15 to 19	86.3	45.9	40.5	83.1	44.7	38.5	82.9	44.6	38.3
20 to 24	106.3	59.4	46.8	110.4	62.6	47.7	109.5	62.7	46.8
25 to 29	95.8	48.8	47.0	100.0	51.2	48.8	101.4	52.5	48.9
30 to 34	85.1	43.6	41.5	93.8	47.4	46.3	98.2	49.8	48.4
35 to 39	65.5	33.4	32.1	79.9	40.5	39.4	88.8	44.8	43.9
40 to 44	46.9	23.5	23.4	62.9	31.4	31.4	75.6	37.7	37.9
45 to 49	43.6	20.8	22.8	50.1	24.4	25.7	61.8	30.2	31.6
50 to 54	49.8	23.2	26.6	47.3	22.4	24.9	52.8	25.4	27.4
55 to 59	48.3	24.2	24.1	47.1	22.4	24.7	47.7	22.6	25.1
60 to 64	38.3	19.0	19.3	43.7	21.1	22.6	44.8	21.1	23.7
65 to 69	28.8	15.3	13.5	36.0	17.9	18.2	40.0	19.1	20.9
70 to 74	20.6	11.0	9.6	26.7	13.5	13.2	32.2	15.5	16.7
75 to 79	13.7	6.6	7.1	18.1	9.0	9.1	23.1	11.1	12.1
80 to 84	7.6	3.3	4.3	11.2	5.2	6.0	14.8	6.9	8.0
85 and over ..	5.6	2.1	3.5	9.5	3.8	5.8	14.0	5.7	8.3
Median age ..	28.4	27.7	29.2	29.9	28.9	30.9	31.3	30.1	32.5

Continued on the next page.

Table 13.-- RESIDENT POPULATION PROJECTIONS BY AGE AND SEX: 1980 TO 2005 -- Con.

Age in years	1995			2000			2005		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Total .	1,211.5	613.2	598.3	1,267.8	639.9	627.9	1,310.0	659.8	650.1
0 to 4	91.3	46.7	44.6	91.8	47.0	44.8	91.3	46.8	44.5
5 to 9	87.0	44.8	42.2	88.6	45.6	43.0	88.8	45.7	43.1
10 to 14 ...	82.1	42.1	40.0	84.7	43.4	41.2	85.7	43.9	41.7
15 to 19 ...	85.2	45.8	39.4	87.5	46.9	40.6	89.0	47.7	41.3
20 to 24 ...	109.5	62.8	46.6	109.4	62.9	46.5	109.6	63.1	46.6
25 to 29 ...	101.2	52.8	48.4	99.9	52.3	47.6	98.8	51.7	47.0
30 to 34 ...	99.6	51.0	48.7	98.6	50.7	47.9	96.8	50.0	46.8
35 to 39 ...	93.5	47.4	46.1	94.8	48.3	46.4	93.8	48.1	45.7
40 to 44 ...	84.1	41.9	42.2	88.4	44.3	44.1	89.6	45.2	44.4
45 to 49 ...	72.7	35.6	37.1	80.3	39.5	40.8	84.3	41.7	42.6
50 to 54 ...	62.2	30.1	32.1	71.1	34.6	36.5	77.5	37.9	39.7
55 to 59 ...	53.2	25.4	27.8	61.0	29.3	31.7	68.6	33.1	35.5
60 to 64 ...	47.2	22.2	25.0	52.3	24.7	27.6	59.0	28.0	31.0
65 to 69 ...	42.1	19.7	22.5	45.2	20.9	24.2	50.0	23.2	26.8
70 to 74 ...	35.7	16.5	19.2	38.3	17.4	20.9	41.6	18.7	22.8
75 to 79 ...	27.4	12.5	14.9	30.4	13.4	17.0	33.1	14.4	18.8
80 to 84 ...	18.5	8.2	10.3	21.6	9.2	12.4	24.0	9.9	14.1
85 and over	19.0	7.7	11.3	24.0	9.4	14.6	28.6	10.8	17.8
Median age .	32.5	31.1	33.9	33.7	32.2	35.3	34.7	33.1	36.5

Table 14.-- COMPONENTS OF CHANGE IN THE "OTHER CIVILIAN" POPULATION:
ANNUAL AVERAGES, 1980 TO 2005

Series	Net change	Natural increase	Births	Deaths	Net migration	
					Number	Percent of net change
M-O	6,400	6,400	13,500	7,100	-	0
M-5	12,400	7,400	14,800	7,300	5,000	40.3
M-10	18,500	8,500	16,100	7,600	10,000	54.1
M-B	6,100	6,300	13,400	7,100	-200	-3.3
M-C	23,100	8,900	16,600	7,700	14,100	61.0
L-F	12,800	6,600	14,100	7,400	6,200	48.4
M-F	13,600	7,800	15,300	7,500	5,800	42.6
1980-85 .	18,000	9,500	14,700	5,200	8,500	47.2
1985-90 .	16,100	8,900	15,300	6,400	7,200	44.7
1990-95 .	14,600	8,000	15,500	7,500	6,600	45.2
1995-2000	11,300	7,100	15,600	8,600	4,200	37.2
2000-2005	8,400	5,900	15,500	9,600	2,500	29.8
H-F	15,000	9,600	17,100	7,500	5,400	36.0

Source: Present study.

Table 15.-- VISITOR INDUSTRY PROJECTIONS: 1982 TO 2005

[Series M-F]

Subject	1982 (actual)	1985	1990	1995	2000	2005
Visitor arrivals (1,000)	4,243	5,000.0	6,083.3	7,052.2	7,786.2	8,183.4
Non-Japanese	3,528	4,125.0	4,866.6	5,641.8	6,229.0	6,546.7
Japanese	715	875.0	1,216.7	1,410.4	1,557.2	1,636.7
Average visitor census (1,000)	105.0	124.0	155.6	179.0	197.6	207.7
Oahu	72.0	80.6	95.0	102.0	106.7	112.2
Hawaii County	7.0	9.9	14.0	17.9	21.7	22.8
Kauai County	7.3	8.7	12.4	16.1	19.8	20.8
Maui County	18.8	24.8	34.2	43.0	49.4	54.0
Hotel and condo units, June (1,000) .	59.4	63.6	79.2	91.7	101.4	106.5
Oahu	34.8	35.6	39.6	43.2	45.6	47.9
Hawaii County	7.1	7.6	11.1	13.8	15.2	16.0
Kauai County	5.2	5.7	8.7	11.0	13.2	13.8
Maui County	12.3	14.6	19.8	23.8	27.4	28.8
Hotel employment (1,000)	26.5	28.3	31.8	35.0	36.9	37.1
Oahu	14.7	15.1	16.2	16.8	17.0	17.1
Hawaii County	3.2	3.8	4.5	5.3	5.7	5.7
Kauai County	2.2	2.4	3.0	3.7	4.1	4.1
Maui County	6.4	6.9	8.1	9.3	10.1	10.2
Visitor and crew expenditures (millions of 1980 dollars)	3,171.7	3,669.7	4,477.4	5,190.5	5,730.6	6,022.9

Source: Present study.

Table 16.-- POPULATION PROJECTIONS, RESIDENT AND DE FACTO,
BY COUNTIES: 1970 TO 2005

[Series M-F; in thousands]

Type of population and year	State total	City and County of Honolulu	Other counties			
			Total	Hawaii	Kauai	Maui <u>1/</u>
Resident population: <u>2/</u>						
1970	776.0	634.7	141.3	64.5	30.1	46.7
1980	969.0	765.0	204.0	92.8	39.3	71.9
1985	1,057.8	815.3	242.6	109.7	46.0	86.9
1990	1,138.4	859.3	279.1	122.6	55.1	101.4
1995	1,211.5	896.9	314.6	134.4	63.9	116.3
2000	1,267.8	925.7	342.2	143.2	69.1	129.9
2005	1,310.0	954.5	355.5	147.6	72.2	135.7
De facto population: <u>3/</u>						
1970	802.9	653.3	149.6	67.3	32.6	49.7
1980	1,055.9	823.7	232.2	99.3	46.3	86.7
1985	1,166.4	883.4	283.0	118.2	54.2	110.6
1990	1,277.5	941.1	336.4	135.1	66.9	134.4
1995	1,373.0	985.2	387.8	150.6	79.3	157.9
2000	1,447.2	1,018.2	429.0	163.1	88.2	177.7
2005	1,501.0	1,052.1	448.9	168.6	92.2	188.1

1/ Includes Kalawao.

2/ As of July 1. The resident population is defined as the number of persons whose usual place of residence is in an area, regardless of physical location on the estimate or census date. It includes military personnel stationed or homeported in the area but excludes persons of local origin attending school or in military service outside the area.

3/ The de facto population is defined as the number of persons physically present in an area, regardless of usual place of residence; it includes visitors present but excludes residents temporarily absent. Resident population present based on July 1 estimate; visitors present and residents absent based on calendar year averages.

Source: Present study.

Table 17.-- ANNUAL GROWTH RATES IN RESIDENT AND DE FACTO
POPULATIONS, BY COUNTIES: 1970-1980 AND 1980-2005

[Annual percent change, annually compounded]

County	Resident population		De facto population	
	1970 to 1980	1980 to 2005	1970 to 1980	1980 to 2005
State total	2.2	1.2	2.8	1.4
City and County of Honolulu ...	1.9	0.9	2.3	1.0
Other counties	3.7	2.2	4.5	2.7
Hawaii	3.7	1.9	4.0	2.1
Kauai	2.7	2.5	3.6	2.8
Maui and Kalawao	4.4	2.6	5.7	3.1

Source: Calculated from preceding table.

As striking as these projections of resident population may seem, corresponding figures for de facto population are even more remarkable. Based on the intermediate assumption regarding increases in visitor arrivals (series F), the average visitor census could be expected to double, from 105,000 in 1982 to 207,700 in 2005 (table 15). The much smaller number of residents temporarily out of the State, in contrast, is likely to increase more or less proportionately to population. (The projections hold the ratios constant by counties at the 1982 levels.) The de facto population is thus expected to rise more sharply than the resident total, reaching a 2005 statewide figure of 1,501,000 under the M-F assumptions. Annual growth rates, compounded for the 1980-2005 period, would accordingly be 1.2 percent for the resident total (well under the 1970-1980 average of 2.2 percent) but 1.4 percent for the de facto total (compared with 2.8 percent in 1970-1980). The tourism projections used in this analysis are cited in table 15. Tables 16 and 17 compare the resident and de facto population projections.

County Projections

The statewide projections, as noted earlier, were then allocated by counties using a shift-share approach. These projections are summarized in table 18.

These projections indicate a general continuation of the trends evident in the recent past, with growth slowest on Oahu and most rapid in Kauai and Maui Counties. By 2005 the resident population can be expected to rise to 954,500 for Oahu, 147,600 for the Big Island, 135,700 for Maui County, and 72,200 for Kauai County. The corresponding de facto totals would be 1,052,100 for Oahu, 168,600 on the Big Island, 188,100 in Maui County, and 92,200 on Kauai and Niihau. Annual growth rates for the

Table 18.-- POPULATION AND ECONOMIC PROJECTIONS, BY COUNTIES: 1980 TO 2005

[Series M-F]

County and variable	1980	1985	1990	1995	2000	2005
Honolulu:						
Resident population (1,000)	765.0	815.3	859.3	896.9	925.7	954.5
De facto population (1,000)	823.7	883.4	941.1	985.2	1,018.2	1,052.1
Total jobs (1,000)	411.7	426.7	452.4	475.9	493.3	506.8
Military jobs	58.4	58.4	58.4	58.4	58.4	58.4
Civilian jobs	353.3	368.3	394.0	417.5	434.9	448.4
Agriculture	3.8	2.6	2.4	2.2	2.1	2.0
Manufacturing	17.5	16.8	17.0	17.2	17.3	17.2
Construction	19.5	16.8	18.2	19.7	20.8	21.7
Transp., com., and util.	25.7	26.2	28.4	30.0	31.0	31.2
Eating and drinking places	28.6	31.5	33.3	34.9	35.4	35.5
Other trade	59.0	62.5	69.0	75.1	80.1	84.2
Finance, insurance and real estate	27.0	28.5	30.6	32.4	33.8	34.9
Hotels	15.2	15.1	16.2	16.8	17.0	17.1
Other services	62.6	68.7	75.0	81.1	85.8	89.4
State and local government	46.7	47.9	50.3	52.6	54.5	56.5
Federal government	28.9	31.1	31.8	32.6	33.3	34.1
Self-employed	18.8	20.6	21.8	22.9	23.7	24.5
Personal income (\$ 1980 millions) .	8,107.0	8,900.7	10,123.8	11,398.6	12,655.6	13,943.3
Per capita personal income (\$ 1980)	10,599	10,917	11,781	12,709	13,671	14,608

Continued on next page.

Table 18.-- POPULATION AND ECONOMIC PROJECTIONS, BY COUNTIES: 1980 TO 2005 -- Con.

County and variable	1980	1985	1990	1995	2000	2005
Hawaii:						
Resident population (1,000)	92.8	109.7	122.6	134.4	143.2	147.6
De facto population (1,000)	99.3	118.2	135.1	150.6	163.1	168.6
Total jobs (1,000)	36.6	40.8	46.6	52.1	56.3	57.9
Military jobs	0	0	0	0	0	0
Civilian jobs	36.6	40.8	46.6	52.1	56.3	57.9
Agriculture	3.0	3.6	3.8	3.8	3.8	3.7
Manufacturing	2.9	2.7	2.8	2.8	2.8	2.8
Construction	1.9	1.7	2.0	2.2	2.5	2.6
Transp., com., and util.	1.9	2.2	2.5	2.9	3.1	3.2
Eating and drinking places	1.9	2.5	3.5	4.3	5.1	5.4
Other trade	5.1	5.7	6.5	7.2	7.7	7.9
Finance, insurance and real estate	1.2	1.3	1.5	1.7	1.9	2.0
Hotels	3.1	3.8	4.5	5.3	5.7	5.7
Other services	3.9	4.4	5.1	5.9	6.6	6.9
State and local government	5.9	6.4	7.3	8.1	8.7	9.0
Federal government	.6	.6	.7	.7	.7	.7
Self-employed	5.4	5.8	6.5	7.2	7.7	8.0
Personal income (\$ 1980 millions) .	771.0	918.1	1,115.0	1,324.7	1,523.7	1,676.3
Per capita personal income (\$ 1980)	8,326	8,369	9,095	9,856	10,640	11,357

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Table 18.-- POPULATION AND ECONOMIC PROJECTIONS, BY COUNTIES: 1980 TO 2005 -- Con.

County and variable	1980	1985	1990	1995	2000	2005
Kauai:						
Resident population (1,000)	39.3	46.0	55.1	63.9	69.1	72.2
De facto population (1,000)	46.3	54.2	66.9	79.3	88.2	92.2
Total jobs (1,000)	17.6	20.0	24.4	28.7	31.3	32.8
Military jobs	0	0	0	0	0	0
Civilian jobs	17.6	20.0	24.4	28.7	31.3	32.8
Agriculture	1.5	1.6	1.6	1.4	1.2	1.0
Manufacturing	1.1	1.1	1.2	1.3	1.3	1.3
Construction	.9	.9	1.1	1.3	1.5	1.5
Transp., com., and util.	1.6	1.7	2.2	2.6	2.9	2.9
Eating and drinking places	1.4	1.8	2.4	3.1	3.5	3.9
Other trade	2.3	2.6	3.3	4.1	4.7	5.1
Finance, insurance and real estate	.9	1.0	1.2	1.4	1.6	1.7
Hotels	1.9	2.4	3.0	3.7	4.1	4.1
Other services	1.8	2.2	2.8	3.3	3.6	3.8
State and local government	2.5	2.8	3.4	3.9	4.2	4.5
Federal government	.3	.3	.3	.3	.3	.3
Self-employed	1.4	1.7	2.0	2.3	2.5	2.6
Personal income (\$ 1980 millions) .	335.0	407.7	528.5	661.2	769.4	859.3
Per capita personal income (\$ 1980)	8,546	8,863	9,592	10,347	11,135	11,902

Continued on next page.

Table 18.-- POPULATION AND ECONOMIC PROJECTIONS, BY COUNTIES: 1980 TO 2005 -- Con.

County and variable	1980	1985	1990	1995	2000	2005
Maui:						
Resident population (1,000)	71.9	86.9	101.4	116.3	129.9	135.7
De facto population (1,000)	86.7	110.6	134.4	157.9	177.7	188.1
Total jobs (1,000)	33.7	41.5	48.8	56.6	63.5	66.3
Military jobs	0	0	0	0	0	0
Civilian jobs	33.7	41.5	48.8	56.6	63.5	66.3
Agriculture	3.2	3.2	3.3	3.2	3.1	3.0
Manufacturing	2.2	2.1	2.1	2.1	2.1	2.1
Construction	1.8	1.8	2.2	2.6	2.9	3.1
Transp., com., and util.	1.7	2.0	2.4	2.8	3.2	3.3
Eating and drinking places	2.5	3.3	4.4	5.5	6.6	7.0
Other trade	4.5	5.6	6.9	8.5	10.0	11.0
Finance, insurance and real estate	2.1	2.9	3.5	4.1	4.7	5.0
Hotels	4.8	6.9	8.1	9.3	10.1	10.2
Other services	3.4	4.5	5.5	6.5	7.5	7.9
State and local government	3.9	4.9	5.7	6.5	7.2	7.4
Federal government	.3	.3	.3	.3	.3	.4
Self-employed	3.2	3.8	4.5	5.2	5.8	6.1
Personal income (\$ 1980 millions) .	648.0	901.3	1,129.0	1,389.9	1,663.1	1,855.2
Per capita personal income (\$ 1980)	9,088	10,372	11,134	11,951	12,803	13,671

1980-2005 period range from 0.9 to 2.6 percent in resident population and from 1.0 to 3.1 percent in de facto population.

Whether measured in terms of population, employment, or income, Oahu will grow at a slower rate than the Neighbor Islands. For example, compared to the 1.2 percent rate for the State, Oahu's population will increase at a 0.9 percent rate between 1980 and 2005 (table 17). However, in spite of the fact that Oahu will grow at the slowest pace among the counties, its absolute gains in population, employment, and income will be the greatest. Of the 340,000 new residents expected for the State, Oahu will house about 190,000, raising its population to 954,500 by 2005. Nearly three out of every five jobs created in the State over the next 25 years will be found on Oahu by 2005, with 506,800 jobs and \$13.9 billion (in 1980 dollars) in personal income (table 18). Oahu will still support 76 percent of the State's economic activity.

Hawaii County, which currently ranks second in size, is expected to grow at the second slowest rate. Population will increase at a rate of 1.9 percent per year, with the number of residents rising from 92,800 to 147,600 during the 25-year period. Employment will climb from 36,600 to 57,900 jobs, while personal income will increase from \$0.8 to \$1.7 billion. By 2005, Hawaii County will account for 11 percent of the State's people and 9 percent of its jobs and income.

Maui County will witness the highest growth rate. Maui's population, which numbered 71,900 in 1980, will grow at an average annual rate of 2.6 percent, reaching 135,700 by 2005. Employment will expand by 97 percent, from 33,700 jobs in 1980 to 66,300 in 2005. Personal income will nearly triple before hitting \$1.9 billion in 2005. In that year, Maui will represent approximately 10 percent of the State's economy.

Kauai, the smallest of the State's four counties, will grow nearly as rapidly as Maui. Its population will increase from 39,300 to 72,200 for a growth rate of 2.5 percent annually during the 25-year period. The Kauai economy will add 15,200 new jobs and \$0.5 billion of personal income. In spite of this relatively quick pace of development, Kauai will still account for only 5 percent of the State's economic activity by 2005.

Although available methods and resources do not permit making meaningful forecasts of age and sex structure by counties, recent trends have suggested an overall convergence in age and sex combined with a continued concentration of armed forces and their dependents on Oahu. If this tendency persists over the coming decades, it seems likely that all four counties will share in the falling percentage of children, the sharp upsurge in older persons, and the moderation of the once-high sex ratio projected for the State as a whole.

Alternative Simulations

The future growth of Hawaii will continue to hinge upon development of the visitor industry. In fact, as evident by the increasing share of exports represented by visitor expenditures and the relatively high growth rates of jobs in eating and drinking places and hotels, the economy will become even more dependent upon tourism over time. Because of the uncertainty with regard to the visitor industry projections, alternative simulations of the economy have been developed assuming different growth rates. It should be noted that the simulations were developed by changing only the visitor assumptions. All other variables such as unemployment rates, labor force participation rates, and other export projections which may be affected by these changes were held the same as the series M-F inputs.

Table 19.-- ALTERNATIVE STATEWIDE POPULATION AND ECONOMIC SIMULATIONS: 1980 TO 2005

Variable	1980	1985	1990	1995	2000	2005
Baseline forecasts (Series M-F)						
Visitor arrivals (1,000)	3,935.0	5,000.0	6,083.3	7,052.2	7,786.2	8,183.4
Resident population (1,000)	968.0	1,057.8	1,138.4	1,211.5	1,267.8	1,310.0
Total jobs (1,000)	499.5	529.0	572.3	613.4	644.5	663.9
Agriculture	11.5	11.0	11.1	10.6	10.2	9.8
Manufacturing	23.8	22.8	23.0	23.4	23.4	23.4
Nonmanufacturing	287.9	310.5	345.2	378.3	403.4	418.4
Government 1/	147.4	152.7	158.1	163.4	167.7	171.2
Self-employed	28.9	32.0	34.9	37.7	39.8	41.1
Personal income (\$ 1980 millions)	9,862.0	11,127.8	12,896.3	14,774.3	16,611.9	18,334.1
Per capita personal income (\$ 1980)	10,188	10,520	11,328	12,195	13,103	13,995
High forecasts (Series M-C)						
Visitor arrivals (1,000)	3,935.0	5,021.0	6,409.0	8,180.0	10,439.0	13,324.0
Resident population (1,000)	968.0	1,059.2	1,155.2	1,267.1	1,393.7	1,544.9
Total jobs (1,000)	499.5	529.7	581.8	645.3	716.6	797.6
Agriculture	11.5	11.0	11.1	10.9	10.7	10.8
Manufacturing	23.8	22.8	23.3	24.3	25.3	26.7
Nonmanufacturing	287.9	311.2	353.8	406.7	468.1	538.4
Government 1/	147.4	152.7	158.1	163.5	167.8	171.5
Self-employed	28.9	32.0	35.5	39.9	44.7	50.2
Personal income (\$ 1980 millions)	9,862.0	11,141.0	13,080.2	15,425.7	18,174.5	21,407.2
Per capita personal income (\$ 1980)	10,188	10,518	11,323	12,174	13,040	13,857

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Table 19.-- ALTERNATIVE STATEWIDE POPULATION AND ECONOMIC SIMULATIONS: 1980 TO 2005 -- Con.

Variable	1980	1985	1990	1995	2000	2005
Low forecasts (Series M-B)						
Visitor arrivals (1,000)	3,935.0	4,357.0	4,357.0	4,357.0	4,357.0	4,357.0
Resident population (1,000)	968.0	1,025.0	1,047.2	1,072.0	1,096.0	1,120.0
Total jobs (1,000)	499.5	510.2	520.8	535.6	549.8	561.6
Agriculture	11.5	10.9	10.7	10.1	9.5	9.2
Manufacturing	23.8	22.3	21.6	21.3	21.0	20.8
Nonmanufacturing	287.9	293.6	299.1	308.6	318.4	326.4
Government ^{1/}	147.4	152.7	158.0	163.2	167.5	171.0
Self-employed	28.9	30.7	31.4	32.4	33.4	34.2
Personal income (\$ 1980 millions)	9,862.0	10,791.5	11,899.3	13,173.8	14,546.3	15,973.0
Per capita personal income (\$ 1980)	10,188	10,528	11,363	12,289	13,272	14,262

^{1/} Includes Armed Forces.

As indicated in table 19, the high case (series M-C) assumes that visitor arrivals will grow at an annual rate of 5 percent, instead of the 3.0 percent rate under the baseline case. At that rate, visitor arrivals would reach 13.3 million by 2005, bringing employment in eating and drinking places to 72,300 jobs and hotels to 58,100. Total employment would reach 797,600 jobs in that year, nearly 133,700 more than forecast in the baseline case (series M-F). Personal income would hit \$21.4 billion. Improved conditions in the local labor market, as signaled by high job and income growth rates, would in turn provide enough jobs for a greater flow of migrants into the State. As a consequence, population would reach 1,544,900 in 2005, 18 percent higher than the baseline projection.

Slower development in the visitor industry would have the opposite effect. Taking an extreme position, the low case (series M-B) assumes no long-run growth in the number of visitors. Under these conditions, Hawaii would have 102,300 fewer jobs and 190,000 fewer people than projected in the baseline case. As it has been pointed out earlier, decreased job opportunities under such an economic condition, however, will result in not only out-migration of local residents but also high unemployment rates and a depressed economy unless other economic activities replace the visitor industry.

Comparisons with Other Forecasts

At least 136 studies of future population have been issued since the 1920s, including 13 since the release of 1980 census findings late in that year. Comparing the projections and forecasts presented in these earlier studies with those presented in this report can help greatly in evaluating both the methodology and findings of the new analysis.

Projections prior to the middle of 1981 have been documented in DPED Statistical Report 151, Bibliography of Population Forecasts and Projections for Hawaii, 1981 and earlier reports in the same series. Those issued since the compilation of that bibliography are cited in the present study, Appendix D.

Projections prepared before the release of 1980 census tabulations are primarily of historical interest, but more recent studies by different authorities provide useful bases of comparison.

The projection of 1,267,800 residents by the year 2000 recommended for planning purposes in the present study (series M-F) is higher than the corresponding figure of 1,225,900 projected by DPED six years ago (series II-F).

Compared with the half-dozen projections issued since 1981, the new recommended value for 2000 falls in the middle. The others range from 1,165,000 to 1,399,000 but generally cluster close to series M-F. Two of the most important are the 1981 revised projection by the Bureau of Economic Analysis and the 1983 projection by the Bureau of the Census, 1,269,000 in the former case and 1,278,000 in the latter; both are extremely close to the new DPED figure.

The earlier (II-F) DPED projection for Oahu in 2000 was 917,400, compared with the new (M-F) value of 925,700. Seven post-1981 projections by other agencies for that year, in contrast, range from 872,000 to 1,000,000. Six are higher and only one is lower.

For the Neighbor Islands as a group, the new M-F projection for 2000 is 342,200 well above the 1978 II-F projections of 308,500. Only three other projections corresponding to this figure have been proposed by others, all of them by the Bureau of Economic Analysis. The BEA figures

range from 249,000 to 273,000, and thus fall far below the new DPED series.

The foregoing comparisons indicate that series M-F closely approaches the middle ground in projections at the statewide level, and is particularly close to the most reputable of these, as prepared by the Bureau of the Census and Bureau of Economic Analysis. Given the differences from study to study in methodology and assumptions, such a correspondence is both surprising and comforting. In contrast, other authorities expect more rapid growth on Oahu and slower growth on the Neighbor Islands, in distinction to the M-F series. The latter, however, would seem to be far more consonant with recent trends.

It must be pointed out that the population and economic projections contained in this report are long-term projections of economic and demographic trends. Short-term fluctuations in economic activities, especially those economic and demographic changes associated with business cycles, are therefore not dealt in this report. The validation of the model output utilizing actual data therefore would require the comparison of the long-term projections contained in this report with trend data (e.g., moving averages) rather than actual data of any particular year, although the projections are shown for each five-year intervals in this report.

Appendix A. STATE MODEL

The Hawaii Population and Economic Projection and Simulation Model has two basic components: the State model and the County model. This appendix provides a technical description of the State model.

The State model makes long-term projections for 198 economic and demographic variables. The model's principal variables are given in table A-1. For each variable, the table reports the variable's name, unit of measurement, length of the data series, and data source. There are five types of variables in the State model: final demand expenditures (components of Gross State Product), industrial output (production), employment, income, and population. Expenditures, output, and income are generally measured in millions of 1980 dollars. Employment and population are measured in thousands of jobs and persons, respectively. The data series used to estimate the final demand forecasting equations run from 1958-1980. The income data extend from 1958 to 1982, while the employment and population data cover 1960 to 1982. Estimates of labor force, output, and the output submodel parameters (i.e., the input-output coefficients) are made only for 1980, the base year of the Hawaii model. The Hawaii Department of Planning and Economic Development is the data source for final demand expenditures, and the output submodel parameters. Employment data originate with the Hawaii Department of Labor and Industrial Relations. The U.S. Bureau of Economic Analysis is the source of income information, while population estimates come from the U.S. Bureau of the Census.

Table A-1.-- STATE MODEL VARIABLES

Name	Variable	Unit <u>1/</u>	Period	Source <u>2/</u>
1. CPCE80	Per capita consumption expenditures	Thousand	1958-80	DPED
2. PCE80	Personal consumption expenditures	Million	1958-80	DPED
3. ICON80	Investment in construction	Million	1958-80	DPED
4. ICON80L1	Investment in construction, lagged one year	Million	1958-80	DPED
5. IOTH80	Investment other than construction	Million	1958-80	DPED
6. SLCON80	State and local government construction expenditures	Million	1958-80	DPED
7. SLGOV	State and local government other expenditures	Million	1958-80	DPED
8. DEFCON80	Defense construction expenditures	Million	1958-80	DPED
9. DEFOTH80	Other defense expenditures	Million	1958-80	DPED
10. NONDEF80	Federal non-defense expenditures	Million	1958-80	DPED
11. EXTOUT80	Tourism expenditures	Million	1958-80	DPED
12. EX80 _i	Exports, industry i (excluding tourism expenditures)	Million	1958-80	DPED
13. EXOTH80	Other exports	Million	1958-80	DPED
14. FS80	Final sales	Million	1958-80	DPED
15. FD _i	Final demand, industry i	Million	1980	DPED
16. IMP80	Imports	Million	1958-80	DPED

Continued on next page.

Table A-1. STATE MODEL VARIABLES -- Con.

Name	Variable	Unit <u>1/</u>	Period	Source <u>2/</u>
17. GSP80	Gross State Product	Million	1958-80	DPED
18. GSP80L1	Gross State Product, lagged one year	Million	1958-80	DPED
19. $c_i, e_i, s_i, d_i, n_i, x_i$	Final demand coefficients		1980	DPED
20. A	Interindustry matrix		1980	DPED
21. X_i	Output, industry i	Million	1980	DPED
22. JOB_i	Jobs, industry i	Thousands	1980	DLIR
23. JOBSUB	Wage and salary jobs	Thousands	1960-82	DLIR
24. JOBSELF	Self-employed persons	Thousands	1960-82	DLIR
25. JOBCIV	Civilian jobs	Thousands	1980	DLIR
26. NPERCIV	Civilian persons employed	Thousands	1980	DLIR
27. NMIL	Military personnel	Thousands	1960-82	BOC
28. POP	Resident population	Thousands	1960-82	BOC
29. POPNONMIL	Civilian resident population	Thousands	1960-82	BOC
30. LFCIV	Civilian labor force	Thousands	1980	DLIR
31. LFRT	Labor force participation rate	Rate	1980	DPED
32. UNEMCIV	Civilian unemployed persons	Thousands	1980	DLIR

Continued on next page.

Table A-1.-- STATE MODEL VARIABLES -- Con.

Name	Variable	Unit <u>1/</u>	Period	Source <u>2/</u>
33. UNEMRT	Unemployment rate	Percent	1980	DLIR
34. WAGE _i	Wages and salaries, industry i	Million	1958-82	BEA
35. WAGETOT	Wages and salaries	Million	1958-82	BEA
36. YP80	Personal income	Million	1958-82	BEA
37. YD80	Disposable income	Million	1958-82	BEA
38. YD80L1	Disposable income, lagged one year	Million	1958-82	BEA
39. YDPCL1(L2)	Per capita disposable income, lagged one year (two years)	Thousand	1958-82	BEA
40. TAXRT	Hawaii tax rate	Rate	1958-82	BEA
41. DUMMY	Dummy variable	1958-79=1	1958-82	

1/ Unless otherwise note, expenditures, output, and income measured in millions of 1980 dollars.

2/ BEA - U.S. Bureau of Economic Analysis

BOC - U.S. Bureau of the Census

DLIR - Hawaii Department of Labor and Industrial Relations

DPED - Hawaii Department of Planning and Economic Development

The State model identifies 20 industrial sectors. The industries, along with their Standard Industrial Classification (SIC) codes, are given in table A-2. Reflecting Hawaii's key economic activities, there are six agricultural and food product industries and two sectors of the visitor industry (eating and drinking places and hotels).

The State model consists of five interacting submodels: final demand, output, employment, income, and population. The final demand submodel consists of 18 equations, most of which forecast the components of Gross State Product (table A-3). Of the 18 variables, 11 are forecast with behavioral equations (e.g., CPCE80). Seven behavioral equations are estimated with econometric methods, in this case the Ordinary Least Squares (OLS) method, on an annual data running from 1958 to 1980 (e.g., SLCON80). The key explanatory variables used in these equations are GSP and disposable income. Three equations are accounting identities (e.g., GSP80). The remaining variables, principally exports, are exogenous. The projections of these variables are based on agricultural market analyses for specific products and policies of the Hawaii State Plan, particularly with regard to future growth of tourist facilities.

The output submodel is the economic core of the State model. For each of the 20 industries, production is related to the output of other industries and the components of final demand. This input-output submodel is expressed in matrix form at the bottom of table A-4. The input-output coefficients are estimated for 1980. Coefficients for seven components of final demand, which are used to determine the vector of final demand, are shown in table A-4.

Table A-2.-- STATE MODEL INDUSTRY DEFINITIONS: 1972

Industry	Standard Industrial Classification (SIC) Code
1. Sugarcane fields	0133
2. Pineapple fields	Part 0179
3. Other agriculture	Part 01, 02 (except sugarcane & pineapple field)
4. Sugar processing	2061, 2062
5. Pineapple processing	Part 2033
6. Other food processing	Other 20
7. Miscellaneous manufacturing	22-39
8. Construction	15-17
9. Transportation and warehousing	41-47
10. Communication	48
11. Electricity, gas, and sanitary services	49
12. Wholesale trade	50-51
13. Retail trade	52-57, 59
14. Eating and drinking places	58
15. Finance, insurance, and real estate	60-67
16. Hotels	70
17. Health and professional services	80-82
18. Other services	72-79, 83-89
19. Government enterprises	...
20. Other industries <u>1/</u>	...

1/ Earnings of government employ~~ees~~.

Table A-3.-- FINAL DEMAND SUBMODEL

Variable		$\bar{R}^2$	SEE	DW	Method
1.	CPCE80 = -0.29854 + 0.9228(YDPCL1) (-1.59) (33.08)	0.981	0.181 (3.2%)	1.17	OLS
2.	PCE80 = CPCE80(POP)				
3.	ICON80 = -282.78 + 0.10078(GSP80L1) (3.12) (8.48) +275.265 (YDPCL1-YDPCL2) (1.58)	0.801	115.29 (4.0%)	0.48	OLS
4.	IOTH80 = -81.7510 + 0.08592(GSP80L1) (-1.16) (9.14)	0.797	112.96 (22.6%)	1.58	OLS
5.	SLCON80 = -244.0 + 0.04298(GSP80L1) (3.19) (3.15) +148.217 (YDPCL1 - YDPCL2) (3.74) + 147 DUMMY (7.27)	0.904	26.12 (6.7%)	1.47	OLS
6.	SLGOV = -439.4 + 0.184 GSPL1 + 174.08 DUMMY (-4.09) (22.26) (2.41) + 157.24 (YDPCL1 - YDPCL2) (1.23)	0.967	81.09 (7.8%)	1.73	OLS
7.	DEFCON80 = EXOGENOUS				
8.	DEFOTH80 = EXOGENOUS				
9.	NONDEF80 = 43.8123 + 0.0104 (YD80L1) (9.24) (12.55)	0.882	7.02 (7.1%)	1.26	OLS
10.	EXTOUR80 = EXOGENOUS				
11.	EX80 _i = EXOGENOUS				

Continued on next page.

Table A-3.-- FINAL DEMAND SUBMODEL -- Con.

Variable	$\bar{R}^2$	SEE	DW	Method
12. FS80 = PCE80 + ICON80 + IOTH80 + SLCON80 +SLGOV + DEFCON80 + DEFOTH80 + NONDEF80 + EXTOUT80 + EXOTH + $\sum_{i=1}^{20} EX_i$				
13. IMP80 = 97.6153 + 0.3778 FS80 (0.49) (23.61)	0.962	1.72	324.58 (7.2%)	OLS
14. GSP80 = FS80 - IMP80				

Table A-4.-- FINAL DEMAND COEFFICIENTS AND OUTPUT SUBMODEL

Industry	Personal consump- tion c_i	Invest- ment e_i	State and local govern- ment s_i	Federal government		Visitor expenditures	
				Defense d_i	Non- defense n_i	West- bound x_i	Japanese y_i
1. Sugarcane field	0	0	0	0	0	0	0
2. Pineapple field	.00013	0	.00014	0	0	.00137	.00497
3. Other agriculture	.00337	0	.00142	0	.00006	.00184	.00583
4. Sugar processing	.00081	0	.00015	0	0	.00034	.00122
5. Pineapple processing	.00104	0	.00021	0	.00006	.00018	.00064
6. Other food processing	.02407	0	.00728	0	.00086	.00907	.03290
7. Misc. manufacturing	.02000	.02930	.02226	.17828	.00961	.02108	.02856
8. Construction	0	0	0	0	.05747	0	0
9. Transportation and warehousing	.02092	.00950	.01673	.00209	.00585	.07791	.14284
10. Communication	.01905	.01662	.01193	.00521	.00388	.00210	.00074
11. Electricity, gas & sanitary services	.02221	0	.02678	.02991	.00201	0	0
12. Wholesale trade	.03201	.06185	.01589	.00081	.00521	.02278	.04119
13. Retail trade	.08771	.02149	.00061	0	-.00001	.08140	.15975
14. Eating and drinking places	.07657	0	-.00233	.00026	.00124	.23850	.18120
15. Finance, insurance and real estate	.31332	0	.03101	.00015	.01062	.00001	.00003
16. Hotels	.01511	0	.00282	.00044	.00209	.35399	.12794
17. Health and professional services	.10493	0	.08466	.00101	.02473	.0541	.00335
18. Other services	.02472	.00192	.01895	.00119	.00726	.06481	.03033
19. Government enterprises ...	.00480	.00004	.00694	.00048	.00333	.00504	.00499
20. Other industries	.00143	0	0	0	0	0	0
Subtotal	.77219	.14072	.24545	.21983	.13427	.88582	.76646

$$1-20 \text{ FD}_i = c_i C + e_i \text{IOTH} + s_i \text{SLGOV} + d_i \text{DEFOTH} + n_i \text{NONDEF}$$

$$+ x_i \text{EXTOUR} + y_i \text{JPT} + \bar{\text{EX}}_i \text{ for } i = 1, 20, \text{ except } 8 \text{ (construction)}$$

$$8 \text{ FD}_8 = c_8 C + \text{ICON} + \text{SLCON} + \text{DEFCON} + n_8 \text{NONDEF}$$

$$21-40 \quad X = (I-A)^{-1} \text{FD}$$

Given projections of industry output, the labor submodel forecasts the demand for jobs. Jobs include wage and salary employees, which are identified by industry, and self-employed workers. The forecast of jobs for each industry is based on a projection of its productivity factor, n_i , which is defined as the number of jobs per unit of output. As shown in table A-5, the latest productivity factor estimate is for 1983. Productivity factors are expected to drop in the future, since output per worker is expected to increase. A productivity change factor, rn_i , of 0.980, for example, implies that output per worker is projected to rise by 2 percent per year. Estimates of these factors are based on past trends as well as forecasts made at the national level by BEA. The labor submodel also determines the supply of labor by adjusting the rate of migration. In a given year, the net number of migrants moving into or out of the State is such that the resulting population yields a labor force of sufficient size to meet the demand for jobs at a pre-specified unemployment rate. The population submodel determines the labor force by applying projected age-sex specific labor force participation rates (see Appendix B). The assumed long-term unemployment rate is 5.5 percent.

The income submodel forecasts labor earnings by industry, personal income, income taxes, and disposable income (table A-6). Starting in 1983, average annual earnings per job, w_i , are projected along trend lines defined by the earnings change factors, rw_i . A factor of 1.03, for example, implies that average earnings per job in the industry is increasing at an annual rate of 3.0 percent. Personal income is then determined from total earnings. Income taxes are predicted assuming an effective tax rate of 14.5 percent. Disposable income is simply the difference between personal income and income taxes.

Table A-5.-- LABOR SUBMODEL

Sector (pg. 62)	Productivity factor 1980 n_i^{80}	Productivity factor 1983 n_i^{83}	Annual productivity change factor rn_i
1	0.01237	0.01722	-
2	0.03275	0.03354	-
3	0.02037	0.02065	0.9800
4	0.00642	0.00874	-
5	0.01742	0.01696	-
6	0.00939	0.01042	0.9845
7	0.00724	0.00699	0.9845
8	0.01336	0.01386	0.9850
9	0.01512	0.01496	0.9891
10	0.02124	0.02189	0.9822
11	0.00518	0.00468	0.9842
12	0.02509	0.02684	0.9850
13	0.04994	0.05154	0.9950
14	0.02574	0.02672	0.9900
15	0.00899	0.00897	0.9878
16	0.02368	0.02331	0.9900
17	0.03346	0.03457	0.9900
18	0.03860	0.03961	0.9900
19	0.0	0.0	-
20	0.0	0.0	-
21 SLGOV	0.03303	0.03259	-
22 DEFOTH	0.01624	0.01629	0.9850
23 NONDEF	0.0	0.0	0.9850

- 1-20 $JOBX_i = n_i^{83} (rn_i)^t X_i$ for $i=1,20$ (industries 1, 2, 4, 5 exogenous)
- 21 $JOBSLGOV = \text{exogenous}$
- 22 $JOBDEFOTH = n_{22}^{83} (rn_{22})^t DEFOTH$
- 24 $JOBSUB = \sum_{i=1}^{23} JOBX_i$
- 25 $JOBSelf = JOBSUB (JOBSelf_{t-5} / JOBSUB_{t-5})$
- 26 $JOBCIV = JOBSUB + JOBSelf$
- 27 $NPERCIV = JOBCIV / 1.0197$
- 28 $LFRT = \text{determine from demographic model}$
- 29 $NMIL = 58.4$
- 30 $POPNONMIL = POP - NMIL$
- 31 $LCIV = LFRT (POPNONMIL)$
- 32 $UNEMCIV = LFCIV - NPERCIV$
- 33 $UNEMRT = (UNEMCIV / LFCIV) \times 100$
- 34 Adjust net migration (MIGL1) to achieve balance between demand and supply of labor.

Table A-6 -- INCOME SUBMODEL

Sector (pg. 62)	Earnings per worker 1980 w_i^{80}	Earnings per worker 1983 w_i^{83}	1983-2005 annual earnings change factor rw_i
1	15.78	15.48	1.0200
2	12.21	12.09	1.0200
3	12.20	13.00	1.0200
4	17.50	15.03	1.0200
5	10.78	11.83	1.0250
6	13.11	11.69	1.0155
7	14.85	14.08	1.0155
8	20.14	21.15	1.0150
9	18.22	16.88	1.0250
10	20.97	20.03	1.0178
11	22.56	24.46	1.0158
12	15.25	15.01	1.0150
13	9.91	10.27	1.0050
14	6.90	6.81	1.0100
15	14.65	14.82	1.0122
16	11.60	11.85	1.0100
17	14.52	16.80	1.0100
18	11.21	10.62	1.0100
19	0	0	1.0000
20	0	0	1.0000
21 JOBSLGOV ...	14.34	15.37	1.0150
22 JOBDEFOTH ..	21.42	22.24	1.0150
23 JOBNONDEF ..	0	15.00	1.0150
24 NMIL	14.00	15.00	1.0200

$$1-24 \text{ WAGE}_i = w_i^{83}(rw_i)^{t_{\text{JOB}_i}}$$

$$25 \text{ WAGETOT} = \sum_{i=1}^{24} \text{WAGE}_i$$

$$26 \text{ YP} = 1.5409(\text{WAGETOT} - \text{WAGETOT}_{-1}) + \text{YP}_{-1}$$

$$27 \text{ TAXRT} = 0.145$$

$$28 \text{ TAX} = \text{TAXRT}(\text{YP})$$

$$29 \text{ YD} = \text{YP} - \text{TAX}$$

$$31 \text{ YDPC} = \text{YD}/\text{POP}$$

Apart from the population submodel, which is discussed in Appendix B, the final ingredient to the State model is forecasts of exogenous variables (table A-7). As noted previously, exports make up most of the exogenous variables.

Table A-7.-- FORECASTS OF EXOGENOUS VARIABLES

[In millions of 1980 dollars and thousands of jobs]

Variable	1980	1985	1990	1995	2000	2005
EX1	0	0	0	0	0	0
EX2	25.1	30.0	36.0	38.0	40.0	42.0
EX3	57.5	86.2	115.0	125.0	135.0	155.0
EX4	572.1	270.0	260.0	250.0	250.0	250.0
EX5	176.7	131.4	131.4	131.4	131.4	131.4
EX6	71.4	80.8	91.4	103.4	117.0	132.4
EX7	380.7	380.7	380.7	409.3	440.0	473.0
EX8	0	0	0	0	0	0
EX9	577.9	653.8	797.7	924.7	1,031.8	1,084.4
EX10	1.7	1.7	1.7	1.7	1.7	1.7
EX11	0	0	0	0	0	0
EX12	20.0	25.0	30.0	35.0	40.0	45.0
EX13	0	0	0	0	0	0
EX14	0	0	0	0	0	0
EX15	10.1	12.0	14.0	16.0	18.0	20.0
EX16	0	0	0	0	0	0
EX17	10.0	12.0	14.0	16.0	18.0	20.0
EX18	9.5	9.5	9.5	9.5	9.5	9.5
EX19	0	0	0	0	0	0
EX20	0	0	0	0	0	0
EXOTH	326.8	375.5	458.6	587.7	763.3	1,035.1
DEFCON	117.3	129.5	143.0	157.9	174.3	192.4
DEFOTH	1,608.2	1,775.5	1,960.4	2,164.4	2,389.7	2,638.4
UNEMRT	4.9	5.5	5.5	5.5	5.5	5.5
NMIL	58.4	58.4	58.4	58.4	58.4	58.4
TAXRT	0.145	0.145	0.145	0.145	0.145	0.145
JOBSLGOV	59.0	62.0	66.6	71.1	74.6	77.4
JOB1	4.8	4.0	3.6	3.2	2.8	2.6
JOB2	2.5	2.1	2.0	1.9	1.8	1.7
JOB4	3.8	3.4	3.1	2.8	2.5	2.3
JOB5	3.3	2.5	2.3	2.1	1.9	1.8

Appendix B. DEMOGRAPHIC SUBMODEL

The population projections were prepared by the cohort-component method, using various assumptions regarding fertility, mortality, migration, and labor force participation rates, as linked to the State input-output model.

In the cohort-component method, each of the components of population change (fertility, mortality, and migration) is projected separately. The projections start from an estimate of the resident population, by age, sex, and military status, as of July 1, 1980, the base date. This population is carried forward by age and sex to the end of the projection period through the use of appropriate survival rates and projected net migration. Births are similarly computed for each annual period, based on assumptions regarding age-specific fertility rates, and are then carried forward using estimated survival and net migration rates.

Because of the large number and unusual demographic characteristics of military personnel and dependents in Hawaii, it is necessary to treat them as a separate group in all projections. On April 1, 1980, for example, there were 58,443 military personnel and 61,974 of their dependents in the resident population of the State. This group differed appreciably from the rest of the population in age and sex composition. They accounted for 20.6 percent of the births but only 4.3 percent of the deaths in 1980. Stationed in Hawaii for only two or three years in most cases, the armed forces and their dependents contribute disproportionately to both in- and out-migration. Moreover, their numerous Hawaii-born children are included in the out-migration totals within a few years of birth, creating a misleading impression of an overall exodus from the Islands. In all of the projections reported

here, therefore, the cohort-component method was applied only to the civilian population other than military dependents; military personnel and dependents were added as a final step, assuming no changes in their numbers and composition after 1980.

The base population was then estimated for July 1, 1980. 1/ For each of the three military status groups, the age and sex composition found in special tabulations from the 1980 census was used. 2/ The April 1, 1980, totals for military personnel and their dependents were held constant for July 1, but the rest of the population was increased to estimated totals for July 1. Data for April 1, 1980, appear in table B-1.

Vital rates were calculated for 1980 from official records of the Hawaii State Department of Health. Resident live births were tabulated by age and military status of mother and sex of child; resident civilian deaths, by age and sex of the decedent. Birth and death rates were based on the previously computed 1980 population tabulations. These data appear in tables B-2 and B-3.

Various series of population projections were calculated, using three different fertility assumptions, one mortality assumption, one series on labor force participation rates, and three sets of economic assumptions. Except for the projections based on zero net migration, net migration levels were determined by the interaction of the remaining variables.

1/ Hawaii State Department of Planning and Economic Development, The State of Hawaii Data Book, 1983, (Honolulu: DPED 1983), 14, 15, and 17.

2/ Hawaii State Department of Planning and Economic Development, Population Characteristics of Hawaii by Military Status, 1980, Statistical Report 163, (Honolulu: DPED, 1983), table 4.

The fertility and mortality levels used in these projections were based on nationwide projections prepared by the U.S. Bureau of the Census in 1982. Fertility rates for Hawaii were assumed to converge with the projected national rates by 2000. Survival rates for each age-sex group in Hawaii were assumed to change between 1980 and 2000 at the same rate as projected for that group in the nation as a whole, with intermediate years estimated by interpolation. Both fertility and survival rates were held constant after 2000. The Hawaii projections are shown for quinquennial intervals in tables B-4 and B-5.

The three fertility series used in the Hawaii projections were designated "L," "M," and "H," to correspond to the low, medium, and high national series on which they were based. Series L assumed an eventual national completed cohort fertility (average number of lifetime births per woman) of 1.700; Series M, an ultimate average of 1.941; and Series H, of 2.301. The U.S. total fertility rate has declined from 3.654 in 1960 to 2.480 in 1970 and 1.840 in 1980. The Hawaii rates for these years, exclusive of military personnel and dependents, were respectively 3.361, 2.462, and 1.912.

The single mortality assumption indicates a nationwide life expectancy at birth in 2005 of 73.3 years for males and 81.3 years for females. The corresponding figures in 1980 were 70.0 and 77.7 years nationally and 75.04 and 81.45 years in Hawaii.

Civilian labor force participation rates are likewise based on national projections. ^{3/} Overall, rates for each age and sex group between 1980 and 1995 are projected based on projected annual rates of

^{3/} "The 1995 Labor Force: A Second Look," Monthly Labor Review, November 1983, pp. 3-10.

change for that group in the nation as a whole, except rates for women 25 and over which are assumed to converge to U.S. rates. The Hawaii projections are reported in table B-6.

For all series, it was assumed that the age and sex composition of the net in-migration would be proportionate to that of civilians (other than military dependents) surveyed in 1981 and 1982 who had lived in Hawaii less than one year. The 1981-1982 are reported in table B-7.

It should be stressed that this assumption regarding the age and sex composition of net migration is based totally on the composition of recent in-migrants, and makes no allowances for possible differences in the demographic characteristics of out-migrants. Such an assumption was dictated by the lack of readily available information on out-migrants. To the extent that out-migrants differ in age and sex structure from in-migrants, distortions will be introduced into the projections.

A desirable future refinement in the population projections would be to obtain better data on out-migration and treat the opposing streams separately. Such an analysis is in fact now being contemplated as a forthcoming project of the DPED Research and Economic Analysis Division. Sample statistics have been obtained from the 1980 decennial census on three types of out-migrants: Hawaii-born persons living on the Mainland, persons who resided in Hawaii in 1975 but in other states five years later, and ethnic Hawaiians living on the Mainland. The proposed study will include detailed cross-tabulations for these groups on military status, age and sex composition, and other significant variables. Data from this analysis can then be applied to future refinements in the projections of migration.

In all cases, the number of military personnel and dependents reported in Hawaii in 1980 was held constant throughout the projection period, using the age and sex distribution found in the 1980 decennial census.

The resulting projections of total resident population were then converted to corresponding de facto values based on projections of average daily visitor census and the average number of residents temporarily absent. As noted earlier, resident population (the concept used in the decennial census and also in the annual estimates issued by the Bureau of the Census) consists of all persons whose usual place of residence is the area in question. It includes members of the armed forces stationed or homeported in an area and also their dependents if domiciled in that area, regardless of their legal or voting residence, but excludes persons visiting the area on business or vacation. The de facto population, in contrast, includes all persons physically present in the area, whether or not it is their place of usual residence. The de facto total is calculated by adding the number of visitors present, on an annual average basis, to the resident total, and then subtracting the average number of residents out of State. The assumptions underlying the visitor projections have already been described. Absent residents were projected by holding constant the 1982 ratios of absent residents to resident population.

Table B-1.-- AGE AND SEX OF THE RESIDENT POPULATION,
BY MILITARY STATUS: APRIL 1, 1980

Age group (years)	Total resident population	Armed forces	Military dependents	Other civilians
Total	964,691	58,443	61,974	844,274
Under 1	17,113	-	3,085	14,028
1 to 4	59,871	-	10,913	48,958
5 to 9	73,311	-	10,690	62,621
10 to 14	74,747	-	7,389	67,358
15 to 19	86,054	6,009	5,025	75,020
20 to 24	105,987	23,907	6,374	75,706
25 to 29	95,453	11,197	6,331	77,925
30 to 34	84,781	7,792	5,248	71,741
35 to 39	65,309	5,052	3,292	56,965
40 to 44	46,740	2,617	1,555	42,568
45 to 49	43,486	1,089	846	41,551
50 to 54	49,611	493	515	48,603
55 to 59	48,155	203	226	47,726
60 to 64	38,108	75	132	37,901
65 to 69	28,653	-	201	28,452
70 to 74	20,524	-	100	20,424
75 to 79	13,649	9	17	13,623
80 to 84	7,607	-	25	7,582
85 and over ...	5,532	-	10	5,522
Median age	28.4	24.9	14.3	30.0
Males	494,972	54,032	20,192	420,748
Under 1	8,665	-	1,590	7,075
1 to 4	30,873	-	5,498	25,375
5 to 9	37,859	-	5,529	32,330
10 to 14	38,633	-	3,772	34,861
15 to 19	45,740	5,598	2,184	37,958
20 to 24	59,293	21,970	636	36,687
25 to 29	48,617	9,960	408	38,249
30 to 34	43,449	7,345	144	35,960
35 to 39	33,336	4,939	82	28,315
40 to 44	23,428	2,534	18	20,876
45 to 49	20,760	1,001	34	19,725
50 to 54	23,115	428	93	22,594
55 to 59	24,116	185	57	23,874
60 to 64	18,914	63	33	18,818
65 to 69	15,238	-	80	15,158
70 to 74	10,952	-	24	10,928
75 to 79	6,612	9	-	6,603
80 to 84	3,286	-	5	3,281
85 and over ...	2,086	-	5	2,081
Median age	27.7	24.9	7.7	29.7

Continued on the next page.

Table B-1.-- AGE AND SEX OF THE RESIDENT POPULATION,
BY MILITARY STATUS: APRIL 1, 1980 -- Con.

Age group (years)	Total resident population	Armed forces	Military dependents	Other civilians
Females	469,719	4,411	41,782	423,526
Under 1	8,448	-	1,495	6,953
1 to 4	28,998	-	5,415	23,583
5 to 9	35,452	-	5,161	30,291
10 to 14	36,114	-	3,617	32,497
15 to 19	40,314	411	2,841	37,062
20 to 24	46,694	1,937	5,738	39,019
25 to 29	46,836	1,237	5,923	39,676
30 to 34	41,332	447	5,104	35,781
35 to 39	31,973	113	3,210	28,650
40 to 44	23,312	83	1,537	21,692
45 to 49	22,726	88	812	21,826
50 to 54	26,496	65	422	26,009
55 to 59	24,039	18	169	23,852
60 to 64	19,194	12	99	19,083
65 to 69	13,415	-	121	13,294
70 to 74	9,572	-	76	9,496
75 to 79	7,037	-	17	7,020
80 to 84	4,321	-	20	4,301
85 and over ...	3,446	-	5	3,441
Median age	29.1	24.6	22.1	30.4

Source: Hawaii State Department of Planning and Economic Development, Population Characteristics of Hawaii by Military Status, 1980 (Statistical Report 163, September 30, 1983), table 4.

Table B-2.-- RESIDENT LIVE BIRTHS, BY AGE AND MILITARY STATUS OF MOTHER AND SEX OF CHILD:
ANNUAL AVERAGES, 1979-1981

Military status and age (in years) of mother	Number of women	Live births			Births per 1,000 women <u>1/</u>		
		Total <u>2/</u>	Boys	Girls	Total <u>2/</u>	Boys	Girls
Total <u>2/</u>	226,603	17,937	9,247	8,690	79.2	40.8	38.3
Military dependents ..	24,353	3,688	1,903	1,785	151.4	78.1	73.3
Under 20	2,841	382	200	182	134.5	70.4	64.1
20 to 24	5,738	1,629	842	787	283.9	146.7	137.2
25 to 29	5,923	1,123	575	548	189.6	97.1	92.5
30 to 34	5,104	451	230	221	88.4	45.1	43.3
35 to 39	3,210	95	51	44	29.6	15.9	13.7
40 and over	1,537	8	4	4	5.2	2.6	2.6
Other civilians	201,880	14,249	7,344	6,905	70.6	36.4	34.2
Under 20	37,062	1,688	888	800	45.5	24.0	21.6
20 to 24	39,019	4,139	2,106	2,033	106.1	54.0	52.1
25 to 29	39,676	4,521	2,333	2,188	113.9	58.8	55.1
30 to 34	35,781	2,939	1,518	1,421	82.1	42.4	39.7
35 to 39	28,650	842	435	407	29.4	15.2	14.2
40 and over	21,692	119	64	55	5.5	3.0	2.5

1/ Rates for all ages based on population 15 to 44. Rates for births to women under 20 based on population 15 to 19. Rates for births to women 40 and over based on population 40 to 44.

2/ Totals and subtotals include births with age or sex unreported.

Source: Number of women from table B-1. Births from Hawaii State Department of Health, Research and Statistics Office, special tabulation.

Table B-3.-- RESIDENT CIVILIAN DEATHS AND ONE-YEAR SURVIVAL RATES,
BY AGE AND SEX: ANNUAL AVERAGES, 1979-1981

[Excludes armed forces; includes military dependents]

Age in years	Number of deaths			Survival rates		
	Both sexes ^{1/}	Male	Female	Both sexes	Male	Female
All ages ...	4,806	2,880	1,926	.99470	.99347	.99586
Under 1	180	103	77	.98952	.98815	.99093
1 to 4	32	21	11	.99947	.99933	.99962
5 to 9	17	11	6	.99978	.99972	.99984
10 to 14	17	10	7	.99978	.99975	.99982
15 to 19	60	43	17	.99925	.99893	.99957
20 to 24	85	61	24	.99896	.99837	.99946
25 to 29	76	53	23	.99911	.99864	.99950
30 to 34	89	60	29	.99884	.99833	.99930
35 to 39	78	46	32	.99871	.99838	.99900
40 to 44	104	65	39	.99764	.99689	.99832
45 to 49	146	92	54	.99656	.99534	.99761
50 to 54	257	168	89	.99477	.99259	.99663
55 to 59	342	221	126	.99277	.99078	.99476
60 to 64	432	278	154	.98865	.98525	.99199
65 to 69	507	337	170	.98231	.97788	.98732
70 to 74	549	368	181	.97325	.96640	.98109
75 to 79	578	352	226	.95762	.94669	.96788
80 to 84	509	271	238	.93309	.91753	.94492
85 and over ...	743	320	423	.86569	.84644	.87735

^{1/} Includes 2 persons of unknown sex (both under 1 year old).

Source: Deaths from Hawaii State Department of Health, Research and Statistics Office based on 1979 to 1981 annual average. Rates computed from table B-1.

Table B-4.-- AGE-SPECIFIC FERTILITY RATES FOR CIVILIAN WOMEN OTHER THAN MILITARY
DEPENDENTS: SPECIFIED YEARS, 1960 TO 2005

Series and year	Annual live births per 1,000 women, by age (in years)						Total fertility rate
	15 to 19 <u>1/</u>	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44 <u>2/</u>	
1960	55.8	229.1	204.3	116.1	52.0	14.8	3,361
1970	56.3	151.9	158.0	81.3	36.6	8.2	2,462
1980 <u>3/</u>	45.5	106.1	113.9	82.1	29.4	5.5	1,912
Low:							
1985	45.5	104.4	111.8	77.2	26.9	5.0	1,854
1990	45.6	102.7	109.8	72.5	24.8	4.5	1,799
1995	45.6	101.1	107.8	68.2	22.9	4.0	1,748
2000	45.7	99.5	105.9	64.1	21.1	3.6	1,700
2005	45.7	99.5	105.9	64.1	21.1	3.6	1,700
Middle:							
1985	47.1	107.9	115.6	79.8	27.7	5.2	1,916
1990	48.7	109.8	117.3	77.5	26.5	4.8	1,923
1995	50.4	111.7	119.1	75.3	25.2	4.4	1,930
2000	52.2	113.6	120.9	73.2	24.1	4.1	1,941
2005	52.2	113.6	120.9	73.2	24.1	4.1	1,941
Replacement:							
1985	48.0	110.1	117.9	81.4	28.3	5.3	1,955
1990	50.7	114.2	122.1	80.6	27.6	5.0	2,001
1995	53.5	118.5	126.4	79.9	26.8	4.7	2,049
2000	56.5	123.0	130.9	79.2	26.1	4.4	2,100
2005	56.5	123.0	130.9	79.2	26.1	4.4	2,100
High:							
1985	49.1	112.6	120.6	83.3	29.0	5.4	2,000
1990	53.1	119.5	127.8	84.4	28.8	5.2	2,094
1995	57.3	126.9	135.3	85.6	28.7	5.1	2,194
2000	61.9	134.7	143.3	86.8	28.6	4.9	2,301
2005	61.9	134.7	143.3	86.8	28.6	4.9	2,301

Footnotes and source on next page.

Table B-4.-- AGE-SPECIFIC FERTILITY RATES FOR CIVILIAN WOMEN OTHER THAN MILITARY
DEPENDENTS: SPECIFIED YEARS, 1960 TO 2005 -- Con.

- 1/ Numerator includes births to women under 15.
- 2/ Numerator includes births to women 45 and over.
- 3/ Annual average, 1979-1981.

Source: 1960 and 1970 from The State of Hawaii Data Book 1983, table 44; 1980 from present report, table B-2; 1985-2000 based on linear convergence between 1980 Hawaii rates and projected national rates cited in memorandum from Signe Wentrogan, U.S. Bureau of the Census, to members of the Federal-State Cooperative Program for Population Projections, December 16, 1982, and unpublished low and high rates provided by her; 2005 assumed identical to 2000.

Table B-5.-- PROJECTED ANNUAL SURVIVAL RATES, BY AGE AND SEX:
SELECTED YEARS, 1980 TO 2005

Age groups	1980	1985	1990	1995	2000	2005
Males:						
Birth	.98815	.98816	.98818	.98819	.98821	.98821
0 to 4	.99933	.99934	.99934	.99935	.99936	.99936
5 to 9	.99972	.99972	.99973	.99973	.99974	.99974
10 to 14	.99975	.99976	.99977	.99979	.99980	.99980
15 to 19	.99893	.99895	.99896	.99898	.99900	.99900
20 to 24	.99837	.99839	.99841	.99843	.99845	.99845
25 to 29	.99864	.99868	.99873	.99877	.99882	.99882
30 to 34	.99833	.99838	.99843	.99848	.99853	.99853
35 to 39	.99838	.99847	.99855	.99864	.99873	.99873
40 to 44	.99689	.99705	.99721	.99737	.99753	.99753
45 to 49	.99534	.99558	.99582	.99607	.99631	.99631
50 to 54	.99259	.99290	.99322	.99353	.99385	.99385
55 to 59	.99078	.99116	.99154	.99192	.99230	.99230
60 to 64	.98525	.98572	.98618	.98665	.98712	.98712
65 to 69	.97788	.97852	.97917	.97981	.98046	.98046
70 to 74	.96640	.96727	.96815	.96902	.96990	.96990
75 to 79	.94669	.94813	.94957	.95101	.95245	.95245
80 to 84	.91753	.91892	.92032	.92171	.92311	.92311
85 and over .	.84644	.84776	.84909	.85041	.85174	.85174
Females:						
Birth	.99093	.99094	.99094	.99095	.99096	.99096
0 to 4	.99962	.99963	.99963	.99964	.99965	.99965
5 to 9	.99984	.99984	.99984	.99985	.99985	.99985
10 to 14	.99982	.99982	.99982	.99983	.99983	.99983
15 to 19	.99957	.99958	.99959	.99960	.99961	.99961
20 to 24	.99946	.99947	.99949	.99950	.99952	.99952
25 to 29	.99950	.99952	.99953	.99955	.99957	.99957
30 to 34	.99930	.99933	.99935	.99938	.99941	.99941
35 to 39	.99900	.99905	.99909	.99914	.99919	.99919
40 to 44	.99832	.99840	.99847	.99855	.99863	.99863
45 to 49	.99761	.99771	.99781	.99792	.99802	.99802
50 to 54	.99663	.99675	.99687	.99700	.99712	.99712
55 to 59	.99476	.99491	.99505	.99520	.99535	.99535
60 to 64	.99199	.99221	.99243	.99265	.99287	.99287
65 to 69	.98732	.98777	.98821	.98866	.98911	.98911
70 to 74	.98109	.98193	.98276	.98360	.98444	.98444
75 to 79	.96788	.96957	.97126	.97295	.97465	.97465
80 to 84	.94492	.94657	.94822	.94987	.95153	.95153
85 and over .	.87735	.87885	.88036	.88187	.88338	.88338

Source: 1980 from table B-3; 2000 age-sex specific rates for Hawaii assumed to bear same ratio to U.S. rates (as projected by the U.S. Bureau of the Census and cited in memorandum from Signe Wetrogan to members of the Federal-State Cooperative Program for Population Projections, December 16, 1982) as in 1980; 1985-1995 rates by geometric interpolation of 1980 and 2000 rates; 2005 assumed same as 2000.

Table B-6.-- CIVILIAN LABOR FORCE PARTICIPATION RATES, BY AGE AND SEX:
1960 TO 2005

[Excludes armed forces but includes their dependents]

Sex and age	U.S. Census			Projected <u>1/</u>				
	1960	1970	1980	1985	1990	1995	2000	2005
Both sexes <u>2/</u>	58.8	60.4	64.0	...	...	...	...	...
Male, 15 and over <u>2/</u> ..	78.0	74.8	72.7	...	...	...	...	...
15 to 19 <u>2/</u>	29.2	30.6	35.9	36.4	37.0	37.3	37.3	37.3
20 to 24	84.7	79.8	81.9	81.2	80.5	80.2	80.2	80.2
25 to 34	94.8	92.8	91.6	90.9	90.2	89.6	89.6	89.6
35 to 44	96.5	95.5	94.2	94.2	94.3	94.0	94.0	94.0
45 to 54	94.1	94.1	90.8	90.8	90.9	90.7	90.7	90.7
55 to 64	82.2	81.3	70.8	67.6	64.3	63.3	63.3	63.3
65 and over	22.9	21.8	20.0	17.8	15.7	14.0	14.0	14.0
Female, 15 and over <u>2/</u>	40.5	47.4	56.0	...	...	...	...	...
15 to 19 <u>2/</u>	19.8	26.5	33.3	34.5	35.8	36.6	36.6	36.6
20 to 24	46.1	58.3	66.1	70.5	74.9	78.7	81.8	83.4
25 to 34	43.4	51.5	68.8	72.8	77.1	81.7	85.0	86.7
35 to 44	52.1	59.1	71.6	75.2	78.9	82.8	85.3	87.0
45 to 54	51.9	59.6	67.3	68.0	68.8	69.5	69.5	69.5
55 to 64	35.0	43.1	48.9	46.7	44.5	42.5	42.5	42.5
65 and over	9.4	8.6	9.0	8.3	7.6	7.0	7.0	7.0

1/ Rates for each group between 1980 and 1995 are assumed to change at the same rate projected for the nation as a whole, and constant after 1995, except rates for women 25+ which are assumed to converge to 1995 U.S. rates and continue with moderated growth rates to 2005.

2/ Includes 15-year-old civilians in the population base but not in the labor force.

Source: U.S. Census of Population: 1960, Final Report PC(1)-13D, table 115; U.S. Census of Population: 1970, Final Report PC(1)-D13, table 164; U.S. Census of Population: 1980 PC(1)-D13, table 213; "The 1995 Labor Force: A Second Look," Monthly Labor Review, November 1983, pp. 3-10, espec. p. 5.

Table B-7.-- AGE AND SEX OF RECENT MIGRANTS: ANNUAL AVERAGES, 1981-1982

[Persons reported living in another State or foreign country one year earlier. Excludes members of the armed forces, military dependents, and inmates of institutions]

Age	Number			Percent distribution		
	Total	Male	Female	Total	Male	Female
1 and over ...	24,653	12,211	12,442	100.0	42.5	57.5
1 to 4	1,173	499	674	4.8	2.0	2.7
5 to 9	1,325	795	530	5.4	3.2	2.1
10 to 14	1,591	687	904	6.5	2.8	3.7
15 to 19	2,076	1,037	1,039	8.4	4.2	4.2
20 to 24	5,026	2,474	2,552	20.4	10.0	10.4
25 to 29	3,664	2,044	1,620	14.9	8.3	6.6
30 to 34	3,004	1,535	1,469	12.2	6.2	6.0
35 to 39	1,461	715	746	5.9	2.9	3.0
40 to 44	1,315	530	785	5.3	2.1	3.2
45 to 49	837	363	474	3.4	1.5	1.9
50 to 54	1,235	622	613	5.0	2.5	2.5
55 to 59	515	220	295	2.1	0.9	1.2
60 to 64	518	274	244	2.1	1.1	1.0
65 to 69	391	251	140	1.6	1.0	0.6
70 to 74	209	127	82	0.8	0.5	0.3
75 to 79	45	9	36	0.2	0.0	0.1
80 to 84	123	29	94	0.5	0.1	0.4
85 and over	145	-	145	0.6	0.0	0.6

Source: State Department of Health, Hawaii Health Surveillance Survey, special tabulations.

Appendix C. COUNTY MODEL

The county model forecasts 76 variables, 19 variables for each of the State's four counties. There are 16 categories of employment (table C-1). The variables also include population, personal income, and per capita personal income. Employment and population are measured in thousands of jobs and persons, respectively. Personal income is measured in millions of 1980 dollars, while per capita personal income is measured in thousands of 1980 dollars. Each series runs from 1960 to 1982. Employment data originate with the Hawaii Department of Labor and Industrial Relations. The U.S. Bureau of the Census is the source of the population figures. The U.S. Bureau of Economic Analysis publishes the county personal income estimates.

Conceptually, the county model is a disaggregated economic base model. Accordingly, the model distinguishes between basic employment (i.e., jobs in sectors essentially serving demands external to the county economy, such as the hotel industry) and nonbasic employment (i.e., jobs in sectors serving local demand, such as trade). Classified as basic sectors are agriculture, manufacturing, eating and drinking places, hotels, and Federal government. Agriculture and manufacturing employment is forecast on the basis of the trend in the county's share of State employment for that industry (table C-2). Jobs in eating and drinking places, hotels, and Federal government are exogenously determined. In the case of eating and drinking places and hotels, the employment projections are based on the expected number of hotel rooms in each county, forecasts of which come from the Hawaii Department of Planning and Economic Development.

Table C-1.-- COUNTY MODEL VARIABLES

Name <u>1/</u>	Variable	Unit	Source <u>2/</u>
EBASIC	Basic employment	Thousands	DLIR
EAGR	Agriculture employment	Thousands	DLIR
EMFG	Manufacturing employment	Thousands	DLIR
ECON	Construction employment	Thousands	DLIR
ETCU	Transportation, communication & utilities employment	Thousands	DLIR
EEAT	Eating & drinking employment	Thousands	DLIR
ETRADE	Trade (excluding eating & drinking) employment	Thousands	DLIR
EFIR	Finance, insurance & real estate employment	Thousands	DLIR
EHOT	Hotel employment	Thousands	DLIR
EOTSER	Services (excluding hotels) employment	Thousands	DLIR
EGSL	State & local government employment	Thousands	DLIR
EFED	Federal government employment	Thousands	DLIR
EWOT	Wages & salaries employment (excluding construction)	Thousands	DLIR
ESELF	Self employment	Thousands	DLIR
ETOT	Total employment	Thousands	DLIR
POP	Population	Thousands	BOC, DPED
YP80	Personal income	Mil. of 1980 dollars	BEA, DPED
YP80/POP	Per capita personal income	Thous. of 1980 dollars	BEA, DPED

1/ Name has geographical prefix: S - State; O - Oahu; H - Hawaii; M - Maui; K - Kauai.

2/ BEA - U.S. Bureau of Economic Analysis
 BOC - U.S. Bureau of the Census
 DLIR - Hawaii Department of Labor and Industrial Relations
 DPED - Hawaii Department of Planning and Economic Development

Nonbasic employment, population, and personal income are ultimately determined by total basic employment. Specifically, for each county and industry, the ratio of nonbasic employment of total basic employment is related to the corresponding State ratio, yielding a projection of nonbasic employment. Given total county employment, forecasts of county population are derived by relating each county's share of State population to its share of State employment. Finally, county personal income is projected by comparing county income per job to State income per job.

Note that the individual county forecasts are adjusted proportionally such that the sum of the county projections equals the corresponding State projection for the year in question. This step maintains consistency between State and county forecasts.

Table C-2.-- COUNTY MODEL EQUATIONS

Variable	$\bar{R}^2$	SEE	DW	Rho	Method
1. Basic employment					
a. OE_BASIC = OE_HOT + OE_EAT + OE_AGR + OE_MFG + OE_FED					
b. HE_BASIC = HE_HOT + HE_EAT + HE_AGR + HE_MFG + HE_FED					
c. ME_BASIC = ME_HOT + ME_EAT + ME_AGR + ME_MFG + ME_FED					
d. KE_BASIC = KE_HOT + KE_EAT + KE_AGR + KE_MFG + KE_FED					
2. Agriculture employment					
a. OE_AGR = 473.175 + 0.20759 SE_AGR (1.08) (5.46)	0.899	85.017 (2.8%)	1.93	0.808	CORC
b. HE_AGR = -608.1 + 0.4187 SE_AGR (-0.77) (6.76)	0.844	146.89 (4.7%)	2.13	0.938	CORC
c. ME_AGR = -24.89 + 0.311 SE_AGR (0.61) (6.74)	0.951	106.83 (2.8%)	2.03	0.901	CORC
d. KE_AGR = -3.30 + 0.441 SE_AGR (-6.76) (10.76)	0.839	183.77 (8.8%)	1.63		OLS
3. Manufacturing employment					
a. OE_MFG = -630.833 + 0.76202 SE_MFG (-0.38) (10.91)	0.900	186.8 (1.1%)	2.48	0.794	CORC
b. HE_MFG = 295.137 + 0.1075 SE_MFG (0.51) (4.49)	0.466	110.7 (3.8%)	1.43		OLS

Table C-2.-- COUNTY MODEL EQUATIONS -- Con.

Variable	$\bar{R}^2$	SEE	DW	Rho	Method
c. MEMFG = 378.38 + 0.0722 SEMFG (0.50) (2.28)	0.917	84.78 (3.8%)	2.79	0.806	CORC
d. KEMFG = -473.99 + 0.0743 SEMFG (-0.63) (2.36)	0.952	84.44 (5.2%)	2.47	0.842	CORC
4. Construction					
a. OECON/SECON = OEWTOT/SEWTOT					
b. HECON/SECON = HEWTOT/SEWTOT					
c. MECON/SECON = MEWTOT/SEWTOT					
d. KECON/SECON = KEWTOT/SEWTOT					
5. Transportation, communication and utilities employment					
a. OETCU/OEBASIC = -0.00032 + 1.10887 SETCU/SEBASIC (-0.02) (16.38)	0.994	0.002 (0.8%)	1.18	0.800	CORC
b. HETCU = -322.487 + 0.18702 HEBASIC (-4.85) (27.40)	0.972	63.26 (4.3%)	1.27		OLS
c. METCU/MEBASIC = -0.0926 + 0.8681 SETCU/SEBASIC (-1.51) (3.90)	0.840	0.005 (4.0%)	1.68	0.935	CORC
d. KETCU/KEBASIC = -0.4047 + 2.6469 SETCU/SEBASIC (-11.32) (16.58)	0.926	0.008 (3.8%)	1.07		OLS

Table C-2.-- COUNTY MODEL EQUATIONS -- Con.

Variable	$\bar{R}^2$	SEE	DW	Rho	Method
6. Eating and drinking employment					
a. OEEAT = exogenous					
b. HEEAT = exogenous					
c. MEEAT = exogenous					
d. KEEAT = exogenous					
7. Trade employment					
a. OETRADE/OEBASIC = -0.0164 + 1.14218 SETRADE/SEBASIC (-0.45) (16.50)	0.994	0.0042 (0.8%)	1.93	0.783	CORC
b. HETRADE = -143.6 + 0.4315 HEBASIC (-0.66) (19.46)	0.945	205.29 (5.2%)	0.64		OLS
c. METRADE/MEBASIC = -0.3482 + 1.2158 SETRADE/SEBASIC (-10.73) (18.95)	0.942	0.016 (6.1%)	0.75		OLS
d. KETRADE/KEBASIC = -0.2775 + 1.11364 SETRADE/SEBASIC (-7.73) (15.76)	0.918	0.017 (6.0%)	1.67		OLS
8. Finance, insurance and real estate employment					
a. OEFIR/OEBASIC = 0.00861 + 1.13031 SEFIR/SEBASIC (1.57) (46.16)	0.999	0.0012 (0.5%)	2.53	0.800	CORC
b. HEFIR/HEBASIC = 0.0488 + 0.20153 SEFIR/SEBASIC (2.47) (2.13)	0.793	0.007 (8.6%)	1.98	0.646	CORC

Table C-2.-- COUNTY MODEL EQUATIONS -- Con.

Variable	$\bar{R}^2$	SEE	DW	Rho	Method
c. MEFIR/MEBASIC = -0.1372 + 1.16286 SEFIR/SEBASIC (-7.71) (13.33)	0.969	0.009 (10.5%)	2.39	0.485	CORC
d. KEFIR/KEBASIC = -0.1125 + 0.9718 SEFIR/SEBASIC (-9.46) (15.95)	0.920	0.013 (18.1%)	0.44		OLS
9. Hotel employment					
a. OEHOT = exogenous					
b. HEHOT = exogenous					
c. MEHOT = exogenous					
d. KEHOT = exogenous					
10. Services employment (excluding hotels)					
a. OEOTSER/OEBASIC = -0.0381 + 1.2293 SEOTSER/SEBASIC (-1.98) (35.57)	0.999	0.003 (0.6%)	1.98	0.859	CORC
b. HEOTSER/HEBASIC = -0.02723 + 0.5718 SEOTSER/SEBASIC (-0.61) (6.53)	0.964	0.010 (4.3%)	2.01	0.742	CORC
c. MEOTSER/MEBASIC = 0.001532 + 0.47707 SEOTSER/SEBASIC (0.02) (3.66)	0.978	0.010 (4.9%)	2.34	0.888	CORC
d. KEOTSER/KEBASIC = 0.0214 + 0.47856 SEOTSER/SEBASIC (0.22) (2.58)	0.926	0.019 (8.6%)	1.73	0.788	CORC

Table C-2.-- COUNTY MODEL EQUATIONS -- Con.

Variable	$\bar{R}^2$	SEE	DW	Rho	Method
11. State and local government employment					
a. $\text{OEGSL/OEBASIC} = -0.06112 + 1.1849 \text{ SEGSL/SEBASIC}$ (-4.94) (41.38)	0.999	0.0028 (0.6%)	1.53	0.712	CORC
b. $\text{HEGSL/HEBASIC} = 0.3249 + 0.31475 \text{ SEGSL/SEBASIC}$ (5.60) (2.30)	0.676	0.179 (4.1%)	2.09	0.600	CORC
c. $\text{MEGSL/MEBASIC} = 0.1985 + 0.237 \text{ SEGSL/SEBASIC}$ (2.89) (1.55)	0.874	0.0117 (3.5%)	1.19	0.812	CORC
d. $\text{KEGSL/KEBASIC} = -0.036 + 0.9257 \text{ SEGSL/SEBASIC}$ (-3.08) (32.5)	0.971	0.0114 (3.5%)	1.85	-0.21	CORC
12. Federal government employment					
a. $\text{OEFED} = \text{exogenous}$	0.999	60.73 (0.2%)	1.56	0.512	CORC
b. $\text{HEFED} = \text{exogenous}$					
c. $\text{MEFED} = \text{exogenous}$					
d. $\text{KEFED} = \text{exogenous}$					

Table C-2.-- COUNTY MODEL EQUATIONS -- Con.

Variable	$\bar{R}^2$	SEE	DW	Rho	Method
13. Wages and salaries employment (excluding construction)					
a. $OEWTOT = OE\text{BASIC} + OE\text{GSL} + OE\text{TRADE} + OE\text{FIR} + OE\text{TCU} + OE\text{T SER}$					
b. $HEWTOT = HE\text{BASIC} + HE\text{GSL} + HE\text{TRADE} + HE\text{FIR} + HE\text{TCU} + HE\text{T SER}$					
c. $MEWTOT = ME\text{BASIC} + ME\text{GSL} + ME\text{TRADE} + ME\text{FIR} + ME\text{TCU} + ME\text{T SER}$					
d. $KEWTOT = KE\text{BASIC} + KE\text{GSL} + KE\text{TRADE} + KE\text{FIR} + KE\text{TCU} + KE\text{T SER}$					
14. Self employment					
a. $OESELF/OEWTOT = -0.005143 + 0.8957 SESELF/SEWTOT$ (-3.72) (59.04)	0.999	0.0006 (0.7%)	2.33	0.643	CORC
b. $HESELF/HEWTOT = 0.003449 + 2.2365 SESELF/SEWTOT$ (-0.23) (11.29)	0.982	0.008 (3.4%)	2.24	0.641	CORC
c. $MESELF/MEWTOT = 0.04197 + 0.8385 SESELF/SEWTOT$ (0.52) (6.79)	0.968	0.0032 (2.5%)	2.31	0.358	CORC
d. $KESELF/KEWTOT = 0.01293 + 1.11114 SESELF/SEWTOT$ (0.88) (6.61)	0.954	0.004 (3.9%)	1.39	0.826	CORC
15. Total employment					
a. $OETOT = OEWTOT + OESELF + OECON$					
b. $HETOT = HEWTOT + HESELF + HECON$					
c. $METOT = MEWTOT + MESELF + MECON$					
d. $KETOT = KEWTOT + KESELF + KECON$					

Table C-2.-- COUNTY MODEL EQUATIONS -- Con.

Variable	$\bar{R}^2$	SEE	DW	Rho	Method
16. Population					
a. $OPOP/SPOP = OETOT/SETOT + OC \frac{1}{}$					
b. $HPOP/SPOP = HETOT/SETOT + HC \frac{1}{}$					
c. $MPOP/SPOP = METOT/SETOT + MC \frac{1}{}$					
d. $KPOP/SPOP = KETOT/SETOT + KC \frac{1}{}$					
17. Personal income					
a. $OYP80/OETOT = 0.00018 + 1.0211 SYP/SETOT$ (6.11) (486.42)	1.000	0.0001 (0.5%)	1.45		OLS
b. $HYP80/HETOT = -0.00093 + 0.9506 SYP/SETOT$ (-3.73) (54.61)	0.993	0.0005 (2.5%)	0.35		OLS
c. $MYP80/METOT = -0.00102 + 0.91853 SYP/SETOT$ (-6.70) (86.31)	0.997	0.0003 (2.8%)	1.06		OLS
d. $KYP80/KETOT = -0.0004 + 0.8615 SYP/SETOT$ (-2.13) (66.00)	0.995	0.0004 (3.4%)	2.06		OLS

1/ Population ratio correction factor.

Appendix D. BIBLIOGRAPHY OF POPULATION FORECASTS AND PROJECTIONS
FOR HAWAII PUBLISHED SINCE 1981

This appendix summarizes all known population forecasts and projections published for Hawaii since final 1980 census results appeared in 1981. It continues and updates the most recent DPED bibliography, published as Statistical Report 151 on January 15, 1982.

The most recent of the 14 studies summarizes in this memorandum is the new DPED series, designated M-F and described elsewhere in this report.

Statewide forecasts for the year 2000 lie between 1,165,000 and 1,400,000. The DPED projection is 1,267,800, and is quite close to both the revised OBERS projection (1,269,000) and the new Bureau of the Census figure (1,277,700).

Oahu projections for resident population in the year 2000 range from 872,000 to 1,000,000 or more. The DPED figure is 925,700.

Neighbor Island totals in the year 2000 were projected at 249,000 to 273,000 by BEA but 342,200 by DPED.

References 111 through 124 were described in Statistical Report 151. The present memorandum summarizes references 123a (issued since that bibliography) through 136:

123. See DPED Statistical Report 151, p. 10.

123a. U.S. Bureau of Economic Analysis, 1980 OBERS BEA Regional Projections, Vol. 11, Regions 8 & 9, Far West and Alaska and Hawaii (July 1981), pp. 73-77. A detailed presentation (including extensions to 2030) of the projections summarized in reference 123. Statewide projections are given by sex and five-year age groups, and alternate metropolitan-nonmetropolitan projections, for selected years only, are shown based on three different sets of assumptions:

Year	State total	Sex		Age in years		
		Male	Female	Under 15	15 to 64	65 and over
1978 ..	884,779	...	...	...	...	...
1985 ..	1,004,819	514,018	490,801	230,908	687,842	86,068
1990 ..	1,079,087	549,701	529,386	243,018	735,738	100,330
1995 ..	1,151,786	584,762	567,024	261,972	777,283	112,530
2000 ..	1,229,319	621,278	608,041	270,936	836,904	121,479
2010 ..	1,349,978	674,029	675,949	283,798	924,084	142,094
2020 ..	1,452,634	717,335	735,299	313,608	950,452	188,574
2030 ..	1,522,312	745,505	776,807	323,896	968,201	230,215
		City and County of Honolulu		Neighbor Islands		
Year	No-change-in-share	Low-change-in-share	Moderate-change-in-share	No-change-in-share	Low-change-in-share	Moderate-change-in-share
1978 ..	707,777	707,777	707,777	177,002	177,002	177,002
1985 ..	802,147	795,607	793,306	202,672	209,213	211,513
1990 ..	860,915	851,416	846,464	218,172	227,671	232,623
2000 ..	980,250	966,888	956,537	249,069	262,431	272,782
2030 ..	1,214,317	1,195,945	1,176,760	307,994	326,367	345,552

124. See DPED Statistical Report 151, p. 10.

125. U.S. Bureau of Economic Analysis, Memorandum to Regional Projection Users from Lyle Spatz, March 23, 1981. Presents revisions of the projections in reference 123, adjusted for 1980 BEA-Census population differences: 965,000 in 1980, 1,045,000 in 1985, 1,119,000 in 1990, and 1,269,000 in 2000.

126. Honolulu Board of Water Supply, Municipal Water Use Plan, Pearl Harbor Ground Water Control Area (October 1981), p. 21. Includes projections for Oahu derived from the DPED projections in references 117a and 117d:

Year	Resident population	De facto population
1980	753,700	800,680
1985	803,800	859,270
1990	845,000	908,760
1995	885,800	958,310
2000	947,200	1,027,230

127. Bank of Hawaii, "Hawaii's Economic Outlook for 1982," Monthly Review, January 1982. Includes resident population estimates and projections as of July 1: 1981, 989,000; 1982, 1,007,000.

128. Honolulu Department of General Planning, General Plan Five-Year Review, Final Report, February 1982, p. A-52. Includes table presenting population ranges for Oahu by eight development plan areas as of 2000. The Oahu total for that year is shown as 917,400, the II-F figure from reference 117a.

129. U.S. Bureau of the Census, Provisional State Population Projections Prepared for O.M.B. (memorandum to members of the Federal-State Cooperative Program for Population Projections from Signe Wetrogan, April 9, 1982). Projections by States to April 1, 1984, based on 1970-1980 net migration rates adjusted for 1970 census undercounts. The provisional 1984 figure for Hawaii is 1,021,000.

130a. "How U.S. Will Look in Year 2000," U.S. News & World Report, July 26, 1982, p. 8. Cites National Planning Association projections by States for 2000. Hawaii is given as 1,165,000, or 20.7 percent more than in 1980.

130b. "Demographic Forecasts: States in the 1980s," American Demographics, Vol. 4, No. 9, October 1982, pp. 46-47. Cites 1990 projections by States from National Planning Association. The 1990 Hawaii figure is 1,017,330, an increase of 5.4 percent over 1980. Presumably from the same study as the one in reference 130a.

131a. Bank of Hawaii, Hawaii 1982. Annual Economic Review [October 1982], p. 5. Includes forecasts of 995,000 for 1982 and 1,009,000 for 1983.

131b. Bank of Hawaii, Business Trends, Vol. 28, No. 1, March/April 1983, p. [2]. Repeats projections in reference 131a.

132. "U.S. by 2000: A Nation That Won't Sit Still," U.S. News & World Report, April 25, 1983, p. 60. Cites projections by Joint Center for Urban Studies of the Massachusetts Institute of Technology and Harvard University, forecasting an increase of 45 percent in the population of Hawaii between 1980 and 2000. Methodology is not specified.

133. U.S. Bureau of the Census, "Provisional Projections of the Population of States, by Age and Sex: 1980 to 2000," Current Population Reports, Population Estimates and Projections, Series P-25, No. 937, August 1983. Projections of State resident population, by 5-year age groups and sex, to 1990 and 2000, computed by a standard cohort-component technique from 1980 census results and separate assumptions about future levels of fertility, mortality, and net migration (the latter based on continuation of the 1970-1980 rates). Results were as follows (pp. 11 and 18):

Year	Population by broad age groups (in years)					Males per 100 females
	All ages	Under 15	15 to 39	40 to 64	65 and over	
1980 (census) .	965,000	226,000	435,600	227,200	76,300	105.2
1990	1,138,100	251,200	506,500	274,000	106,300	102.7
2000	1,277,700	265,200	495,400	390,500	126,600	102.6

134. Oahu Development Conference, "General Plan Population Projections," Report 172, November 1983. Describes the 1977 General Plan and 1982 General Plan population projections for Oahu and its eight development plan areas. The Oahu total in 2000 was projected at 1,039,000 in the 1977 Plan and 871,500 to 963,300 in the 1982 Plan. The Primary Urban Center population in 2000 was given as 530,000 in the 1977 Plan and 435,800-481,600 in the 1982 Plan.

135a. "1.3 million people expected in Hawaii by the year 2000," Honolulu Advertiser, November 28, 1983, p. A-5. Cites National Planning Association projections for 2000, based on unspecified methodology. These projections indicate that "population will climb from 967,000 in 1980 to 1.3 million. More than one million people will live and work in the Honolulu area." Also, "the average Hawaii resident will earn \$9,389 in the year 2000, measured in 1972 dollar values," compared with a U.S. average "personal income" of \$9,409.

135b. "The States in 1990," American Demographics, Vol. 5, No. 12, December 1983, pp. 20-23, 45, and 46. A comparison of 1990 projections by States, prepared by the U.S. Bureau of the Census (from the August 1983 report cited above) and the National Planning Association. The latter are based on "a model that combines economic and demographic factors," while "the bureau's projections assume only that the net migration of the past decade will continue at the same rate for the next decade or two." The NPA study is presumably the same as that cited (for 2000) in the immediately preceding reference. The projections for Hawaii are as follows:

Source	Population, 1990		Percent increase, 1980-1990	
	Rank	Number	Rank	Percent
Census	42	1,138,100	14	17.9
NPA	40	1,103,710	14	14.1

136. DPED, forthcoming report.

Table D-1.-- POPULATION PROJECTIONS FOR THE STATE OF HAWAII: 1985 TO 2030

[In thousands. Unless otherwise specified, data refer to total resident population]

Source and date of publication		1985	1990	1995	2000	2005	2010	2030
123a.	BEA, 1981	1,005	1,079	1,152	1,229	...	1,350	1,522
125.	BEA, 1981, rev.	1,045	1,119	...	1,269	...	...	...
130.	NPA, 1982	...	1,017	...	1,165	...	...	...
132.	JCUS, MIT, 1983	...	...	...	1,399	...	...	...
133.	Bureau of Census, 1983 ..	...	1,138	...	1,278	...	...	...
135.	NPA, 1983	...	1,104	...	1,300	...	...	...
136.	DPED, 1984 (series M-F):							
	Resident	1,058	1,138	1,211	1,268	1,310	...	...
	De facto	1,166	1,277	1,373	1,447	1,501	...	...

Table D-2.-- POPULATION PROJECTIONS FOR OAHU: 1985 TO 2030

[In thousands. Unless otherwise specified, data refer to total resident population]

Source and date of publication	1985	1990	1995	2000	2005	2010	2030
123a. BEA, 1981:							
"No change in share"	802	861	...	980	...	...	1,214
"Low change"	796	851	...	967	...	...	1,196
"Moderate change"	793	846	...	957	...	...	1,177
126. BWS, 1981:							
Resident	804	845	886	947	...	...	...
De facto	859	909	958	1,027	...	...	...
134. ODC/DGP, 1983:							
Low	...	...	...	872	...	...	...
High	...	...	...	963	...	...	...
135. NPA, 1983	...	...	...	1,000+	...	...	...
136. DPED, 1984 (series M-F):							
Resident	815	859	897	926	954	...	...
De facto	883	941	985	1,018	1,052	...	...

Table D-3.-- POPULATION PROJECTIONS FOR THE NEIGHBOR ISLANDS: 1985 TO 2030

[In thousands. Unless otherwise specified, data refer to total resident population]

Source and date of publication	1985	1990	1995	2000	2005	2010	2030
123a. BEA, 1981:							
"No change in share"	203	218	...	249	...	...	308
"Low change"	209	228	...	262	...	...	326
"Moderate change"	212	233	...	273	...	...	346
136. DPED, 1984 (series M-F):							
Resident	243	279	310	342	356	...	...
De facto	283	336	388	429	449	...	...

Appendix E. DATA BASE

Continued in the following tables are the historical data used to estimate the econometric equations in the State and County models. Table E-1 lists the variable names and descriptions. The data sources and units for each variable are listed on pages 54-56 and 82. Table E-2 reports the components of Gross State Product, which are forecast by the final demand submodel. The series, which run from 1958 to 1980, are measured in millions of 1980 dollars.

Table E-3 gives State and County employment, population, and personal income. These data are principally used to estimate the forecasting equations of the County model. The data extend from 1960 to 1982. Employment is stated in number of jobs, while population is given in number of residents. Personal income is measured in millions of 1980 dollars.

Table E-1.-- DATA BASE VARIABLE DESCRIPTIONS

Variable	Description
PCE80	Personal consumption expenditures
ICON80	Investment in construction
IOTH80	Investment other than construction
SLCON80	State/local government construction expenditures
SLGOV	State/local government non-construction expenditures
DEFCON80	Defense construction expenditures
DEFOTH80	Other defense expenditures
NONDEF80	Federal non-defense expenditures
EXTOUR80	Tourist expenditures
EXOTH80	Other exports
IMP80	Imports
GSP80	Gross State Product
FS80	Final sales
EAGR 1/	Agricultural jobs
EMFG	Manufacturing jobs
EFED	Federal government jobs
EGSL	State/local government jobs
ECON	Construction jobs
ETRADE	Trade jobs (excluding eating and drinking)
EOTSER	Services (excluding hotel) jobs
ETCU	Transportation, communication, utilities jobs
EHOT	Hotel jobs
EEAT	Eating and drinking places jobs
EFIR	Finance, insurance, and real estate jobs
EWOT	Wage and salary jobs
ESELF	Self-employed
ETOT	Total jobs
POP	Resident population
YP	Personal income
EBASIC	Jobs in basic industries (hotels, eating and drinking places, manufacturing, Federal government)

1/ County model variables have geographic prefix: S - State; O - Oahu; H - Hawaii; M - Maui; K - Kauai.

Table E-2.-- HAWAII GROSS STATE PRODUCT: 1958-1980

[Millions of 1980 dollars]

YEAR	PCE80	ICON80	IOTH80	SLCON80	SLGDU	DEFCON80	DEFOTH80	NONDEF80
*****	*****	*****	*****	*****	*****	*****	*****	*****
1958	2328.06			235.81	368.92			61.79
1959	2486.08	359.27	219.43	227.43	417.69	156.81	852.07	67.66
1960	2648.86	538.09	-17.46	251.88	476.48	115.09	1024.73	69.05
1961	2744.29	502.70	204.69	345.65	479.21	93.67	1142.41	75.99
1962	2879.65	489.92	193.53	303.64	524.14	48.41	1095.02	77.39
1963	2912.09	479.32	236.68	320.63	560.98	52.17	1083.86	83.00
1964	3172.42	506.51	311.04	311.75	597.38	96.98	1135.38	95.63
1965	3405.41	653.64	424.16	337.67	676.32	174.47	1131.75	89.33
1966	3608.93	741.32	368.38	352.64	768.84	135.40	1279.11	87.65
1967	3761.26	736.42	514.05	389.45	896.44	83.52	1446.02	81.35
1968	4145.84	773.11	454.21	423.63	986.42	100.51	1468.98	93.02
1969	4533.62	830.25	734.41	554.51	997.21	126.34	1468.00	88.79
1970	4858.80	1256.65	575.24	565.64	1099.32	111.11	1498.33	101.74
1971	5166.96	1118.60	632.00	478.95	1214.72	96.98	1457.99	114.10
1972	5469.63	998.85	601.56	495.51	1306.38	131.86	1517.98	120.63
1973	5902.23	1163.94	733.73	509.30	1356.26	186.84	1634.19	107.99
1974	5866.87	1243.02	754.16	468.74	1394.32	185.29	1580.21	107.13
1975	6130.95	1298.21	629.02	541.07	1658.55	149.30	1626.19	114.05
1976	6437.79	1016.64	676.71	522.86	1634.65	171.60	1553.25	123.41
1977	6725.93	669.07	840.19	392.98	1720.21	154.60	1784.94	126.17
1978	7098.28	798.04	819.84	326.10	1688.90	108.90	1808.80	136.85
1979	7376.77	972.10	700.72	330.30	1594.30	104.93	1687.72	125.37
1980	7723.67	1139.11	900.79	327.17	1459.20	79.10	1646.40	120.00

Table E-2.-- HAWAII GROSS STATE PRODUCT: 1958-1980 -- Con.

YEAR	EXTOUR80	EXOTH80	IMP80	GSP80	FS80
*****	*****	*****	*****	*****	*****
1958	219.59	865.27	2020.08	3645.48	5635.88
1959	283.81	946.30	2266.52	3750.03	5987.91
1960	332.67	955.05	2437.91	3956.52	6362.03
1961	342.30	977.87	2477.89	4430.88	6867.14
1962	381.54	1043.12	2508.18	4528.18	7000.75
1963	449.55	1089.55	2677.29	4590.55	7231.51
1964	494.78	1114.41	2989.18	4847.11	7799.57
1965	531.69	1182.10	4542.55	4064.01	8567.04
1966	638.08	1259.20	3896.48	5343.07	9197.28
1967	835.60	1339.33	3952.07	6131.38	10036.82
1968	930.00	1353.07	4175.23	6553.56	10679.92
1969	1099.76	1244.81	4179.40	7498.29	11617.95
1970	1118.66	1303.01	5111.87	7376.63	12429.39
1971	1271.58	1464.92	4560.58	8456.21	12966.10
1972	1470.10	1369.76	5088.49	8393.78	13429.79
1973	1713.10	1774.90	5651.07	9431.41	15026.37
1974	1908.12	1991.94	5890.66	9609.14	15448.30
1975	1961.83	1907.68	5963.47	10053.38	15960.39
1976	2246.17	1822.52	6232.06	9973.56	16151.23
1977	2435.68	1894.68	6500.60	10243.86	16698.99
1978	2666.35	2077.39	6730.41	10799.05	17489.65
1979	2853.27	2327.59	6884.74	11188.33	18033.87
1980	2888.20	2239.56	7187.00	11336.20	18484.43

Table E-3.-- HAWAII AND COUNTY EMPLOYMENT, POPULATION, AND PERSONAL INCOME: 1960-1982

[Number and millions of dollars]

YEAR	SEAGR	DEAGR	HEAGR	MEAGR	KEAGR	SEMF	DEMF	HEMF	MEMF	KEMF
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1960	13830	3440	2910	4650	2830	25770	16750	3300	3120	2610
1961	13460	3430	2840	4360	2840	25730	17150	3110	2990	2480
1962	12790	3250	2710	4200	2630	25020	16850	3010	2880	2290
1963	12700	3310	2690	4230	2470	25030	17200	2970	2600	2250
1964	12740	3380	2640	4400	2330	25240	17790	2900	2570	1980
1965	12510	3340	2640	4290	2240	24520	17160	3010	2580	1780
1966	12640	3260	2720	4440	2220	24240	16980	3000	2480	1780
1967	12740	3200	2890	4440	2210	24690	17670	2900	2390	1730
1968	12180	2960	2890	4180	2150	23900	17040	2930	2290	1630
1969	11440	2830	2700	3940	1980	25100	18270	2820	2430	1570
1970	12440	3040	3600	4060	1740	25540	18620	2990	2290	1650
1971	11770	2880	3140	3920	1820	25090	18370	2940	2210	1580
1972	11250	2850	3100	3650	1600	24900	18500	2900	2150	1350
1973	10750	2600	3150	3400	1600	23800	17700	2700	2100	1300
1974	10150	2650	3150	3100	1300	22700	17050	2550	1950	1100
1975	11050	2800	3400	3300	1550	23650	17200	3000	2150	1300
1976	11050	2800	3400	3250	1600	23400	17050	2900	2100	1300
1977	11300	2900	3500	3200	1650	23200	17200	2750	2050	1200
1978	11600	3000	3550	3450	1600	23700	17500	2750	2150	1250
1979	10900	2850	3300	3150	1600	23900	17700	2850	2000	1250
1980	10650	2600	3250	3250	1550	23350	17100	2650	2050	1300
1981	11650	2750	3750	3600	1550	23000	16800	2900	1950	1300
1982	11350	2650	3750	3500	1450	22450	16400	2750	2000	1300

Table E-3.-- HAWAII AND COUNTY EMPLOYMENT, POPULATION, AND PERSONAL INCOME: 1960-1982 -- Con.

YEAR	SEFED	DEFED	HEFED	MEFED	KEFED	SEGS	DEGS	HEGS	MEGS	KEGS
1960	27010	26450	310	150	100	22500	16600	2800	1800	1300
1961	27290	26730	260	120	180	23100	17100	2800	1900	1300
1962	27770	27170	260	150	200	23400	17200	2900	2000	1300
1963	27910	27270	270	180	200	24980	18600	3000	1980	1400
1964	28440	27830	230	190	200	26000	19400	3100	2100	1400
1965	29690	29090	250	170	180	28150	21400	3100	2250	1400
1966	31620	31050	230	150	180	31010	23800	3400	2310	1500
1967	33900	33260	270	170	200	32400	25000	3500	2400	1500
1968	34970	34310	270	180	210	34260	26500	3700	2460	1600
1969	34690	33890	300	200	300	36440	28500	3800	2540	1600
1970	33380	32510	360	210	300	40260	31800	4000	2660	1800
1971	32920	32060	370	200	300	45300	36300	4300	2800	1900
1972	32700	31800	350	200	300	46720	37500	4400	2820	2000
1973	31650	30700	350	200	350	46390	37300	4300	2890	1900
1974	31000	30050	400	200	350	47870	38700	4400	2870	1900
1975	30550	29700	400	200	250	51460	41200	5000	3160	2100
1976	29850	28950	450	200	250	54950	43800	5400	3450	2300
1977	29300	28400	450	250	250	56450	44600	5700	3750	2400
1978	29350	28350	450	250	250	57700	45500	5800	3900	2500
1979	29700	28500	600	300	300	56800	44900	5700	3800	2400
1980	30000	28850	600	300	250	59050	46700	5900	3950	2500
1981	30350	29250	600	250	250	58600	46200	5900	3900	2600
1982	31500	30400	600	250	250	58790	46200	6000	3990	2600

Table E-3.-- HAWAII AND COUNTY EMPLOYMENT, POPULATION, AND PERSONAL INCOME: 1960-1982 -- Con.

YEAR	SECON	OECON	HECON	MECON	KECON	SETRADE	DETRADE	HETRADE	METRADE	KETRADE
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1960	17600	16000	900	400	300	33690	28400	2680	1560	1060
1961	17200	15200	1100	600	300	34760	29470	2630	1580	1090
1962	15100	13100	1000	600	400	35560	30130	2710	1610	1110
1963	15100	12900	1200	600	400	35910	30450	2790	1450	1230
1964	16300	13600	1600	700	400	36860	31160	2920	1530	1240
1965	17900	15100	1500	800	500	38500	32570	3160	1490	1270
1966	19000	16400	1300	900	400	40940	34700	3320	1690	1230
1967	16900	14600	1200	700	400	42220	35900	3410	1640	1290
1968	18900	16500	1200	800	400	44320	37360	3650	1980	1340
1969	23000	20500	1200	900	400	47710	40430	3780	2060	1430
1970	25700	22600	1700	1000	400	51320	43690	4050	2170	1420
1971	23400	20000	1800	1100	500	52660	44510	4350	2300	1490
1972	23600	20200	1800	1100	500	54940	46430	4370	2500	1630
1973	26700	22900	1900	1300	600	58000	49230	4470	2760	1540
1974	27900	23800	1800	1600	700	58190	49260	4370	2900	1700
1975	26400	22500	1600	1600	700	58760	49550	4390	3080	1730
1976	21400	17800	1500	1400	700	61220	51580	4460	3320	1870
1977	19800	16400	1400	1500	500	63410	53170	4570	3650	2030
1978	20700	17100	1500	1500	600	66110	55360	4750	3970	2070
1979	23400	19000	1700	2000	700	69400	57840	4980	4350	2230
1980	24000	19000	2000	1900	1100	70790	58970	5080	4470	2270
1981	21900	17600	1900	1500	900	70540	58550	5280	4480	2230
1982	18000	14500	1500	1400	600	71400	59150	5270	4730	2290

Table E-3.-- HAWAII AND COUNTY EMPLOYMENT, POPULATION, AND PERSONAL INCOME: 1960-1982 -- Con.

YEAR	SEOTSER	DEOTSER	HEOTSER	MEOTSER	KEOTSER	SETCU	DETCU	HETCU	METCU	KETCU
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1960	24980	22430	1160	890	500	14780	12400	970	900	500
1961	26780	24190	1170	930	480	14850	12510	960	910	480
1962	28070	25380	1200	890	580	15120	12760	990	900	460
1963	28970	26110	1270	950	650	15370	12930	1100	880	470
1964	30550	27400	1300	1050	800	15630	13320	960	870	480
1965	32540	29050	1460	1150	880	16380	13850	1050	920	560
1966	33830	30020	1450	1240	1120	17450	14820	1150	920	570
1967	35590	31570	1520	1360	1140	18750	15980	1190	860	720
1968	38050	33920	1750	1400	980	20470	17290	1250	960	960
1969	40760	36280	1870	1560	1050	22190	18730	1330	1080	1060
1970	43850	38820	2010	1810	1220	24060	20400	1400	1150	1110
1971	45000	39830	2120	1770	1290	23990	20470	1420	1120	1000
1972	47000	41900	2100	1800	1200	24800	21100	1500	1150	1050
1973	51400	46000	2200	2000	1300	25600	21400	1600	1250	1350
1974	54500	48650	2450	2050	1350	26300	22250	1650	1300	1150
1975	56500	49650	2750	2500	1550	26400	22100	1750	1350	1250
1976	59000	51750	2950	2750	1600	27100	22600	1850	1400	1300
1977	62650	54850	3200	2950	1650	28200	23250	1900	1450	1600
1978	67450	59000	3450	3300	1750	28800	23700	1950	1550	1650
1979	71250	62150	3700	3550	1850	30500	25350	1950	1600	1550
1980	73550	64100	3900	3650	1900	31200	26000	1900	1700	1600
1981	77100	66950	4100	4000	2050	31900	26600	1950	1800	1600
1982	74600	64350	4100	4100	2050	31700	26350	1900	1850	1600

Table E-3.-- HAWAII AND COUNTY EMPLOYMENT, POPULATION, AND PERSONAL INCOME: 1960-1982 -- Con.

YEAR	SEHOT	DEHOT	HEHOT	MEHOT	KEHOT	SEET	DEET	HEET	MHEET	KEET
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1960	4330	3260	480	270	300	9030	8360	410	120	140
1961	4690	3520	460	320	400	9240	8470	430	180	150
1962	4630	3450	470	270	500	9760	8880	470	240	180
1963	5240	3490	500	700	500	10130	9020	470	440	200
1964	5820	3900	540	780	600	10950	9790	500	460	200
1965	6310	3930	850	850	700	12150	10650	580	700	230
1966	7220	4460	1140	890	700	13070	11530	590	690	260
1967	8630	5220	1410	1150	900	14360	12630	650	800	280
1968	10590	6440	1830	1300	1000	14920	13200	690	660	370
1969	12540	8080	1920	1460	1100	16470	14490	780	750	450
1970	13380	9290	1750	1350	1000	18020	15700	1060	820	440
1971	15550	10610	2020	1630	1300	18700	16150	1180	940	440
1972	17600	11850	2450	1950	1400	20310	17570	1230	1000	520
1973	18950	12550	2850	2150	1400	22450	19480	1270	1040	660
1974	19450	12850	3050	2300	1300	23960	20640	1280	1300	740
1975	19950	13150	3050	2450	1300	24990	21050	1460	1620	870
1976	20900	13350	3100	3000	1500	26680	22620	1390	1730	930
1977	22100	14050	3200	3250	1600	28790	24030	1630	2050	1080
1978	22850	14350	3200	3650	1600	31790	26530	1800	2230	1230
1979	24100	15100	3100	4250	1700	33500	27810	1980	2450	1270
1980	24900	15200	3050	4800	1900	34460	28630	1920	2480	1430
1981	24800	14500	3000	5300	2000	34910	28750	1970	2670	1520
1982	26500	14700	3200	6450	2200	34510	28150	2080	2820	1460

Table E-3.-- HAWAII AND COUNTY EMPLOYMENT, POPULATION, AND PERSONAL INCOME: 1960-1982 -- Con.

YEAR	SEFIR	DEFIR	HEFIR	MEFIR	KEFIR	SEWTOT	DEWTOT	HEWTOT	MEWTOT	KEWTOT
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1960	9240	8670	250	210	110	202760	162750	16180	14070	9750
1961	10160	9510	310	240	100	207260	167280	16070	14130	9800
1962	10840	10030	400	280	130	208060	168200	16120	14020	9770
1963	11040	10200	450	230	160	212380	171480	16710	14240	9920
1964	12090	11240	400	260	180	220620	178810	17090	14910	9810
1965	13280	12190	570	310	200	231930	188330	18170	15510	9940
1966	13730	12530	690	320	190	244750	199550	18990	16030	10150
1967	14220	13030	630	370	180	254390	208030	19570	16280	10550
1968	15000	13740	680	410	170	267560	219260	20840	16620	10810
1969	16910	15460	820	440	190	287250	237460	21320	17360	11140
1970	18160	16540	890	470	240	306110	253010	23810	17990	11320
1971	18920	17200	910	540	280	313300	258380	24550	18530	11900
1972	20200	18300	850	700	300	324020	268000	25050	19020	11850
1973	22600	20500	850	850	350	338290	280350	25650	19940	12350
1974	24000	21750	900	950	400	346020	287650	26000	20520	12000
1975	24250	21450	1000	1250	550	353960	290350	27800	22660	13150
1976	24700	21850	1050	1200	650	360250	294150	28450	23800	14000
1977	25650	22450	950	1550	750	370850	301300	29250	25650	14700
1978	28850	25200	1000	1800	850	388900	315600	30200	27750	15350
1979	31500	27350	1100	2050	900	404950	328550	30950	29500	15750
1980	32850	28500	1200	2200	1000	414800	335650	31650	30750	16800
1981	31700	27250	1300	2300	900	416450	335200	32650	31750	16900
1982	31700	27250	1350	2250	850	412490	330100	32500	33340	16650

Table E-3.-- HAWAII AND COUNTY EMPLOYMENT, POPULATION, AND PERSONAL INCOME: 1960-1982 -- Con.

YEAR	SESELF	OESELF	HESELF	MESELF	KESELF	SETOT	OETOT	HETOT	METOT	KETOT
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1960	25330	16610	5430	2000	1300	228090	179360	21610	16070	11050
1961	25690	17110	5230	2100	1300	232950	184390	21300	16230	11100
1962	26350	17740	5210	2100	1300	234410	185940	21330	16120	11070
1963	26310	18130	4670	2200	1300	238690	189610	21380	16440	11220
1964	26970	18600	4810	2200	1300	247590	197410	21900	17110	11110
1965	27690	19150	4910	2300	1400	259620	207480	23080	17810	11340
1966	28060	19380	4980	2300	1400	272810	218930	23970	18330	11550
1967	28700	19970	5000	2400	1400	283090	228000	24570	18680	11950
1968	29480	20450	5140	2400	1500	297040	239710	25980	19020	12310
1969	29900	20890	5090	2400	1500	317150	258350	26410	19760	12640
1970	24910	17270	4360	2100	1200	331020	270280	28170	20090	12520
1971	25590	17760	4470	2200	1200	338890	276140	29020	20730	13100
1972	25900	17900	4450	2400	1200	349920	285900	29500	21420	13050
1973	26100	18050	4450	2300	1300	364390	298400	30100	22240	13650
1974	26350	18100	4550	2400	1300	372370	305750	30550	22920	13300
1975	26850	18300	4600	2600	1400	380810	308650	32400	25260	14550
1976	26500	17950	4650	2600	1400	386750	312100	33100	26400	15400
1977	27400	18300	4950	2800	1400	398250	319600	34200	28450	16100
1978	28500	18800	5300	3000	1400	417400	334400	35500	30750	16750
1979	28900	19100	5350	3100	1400	433850	347650	36300	32600	17150
1980	29050	19100	5400	3200	1400	443850	354750	37050	33950	18200
1981	28650	18550	5400	3400	1400	445100	353750	38050	35150	18300
1982	29850	19550	5300	3600	1500	442340	349650	37550	36940	18150

Table E-3.-- HAWAII AND COUNTY EMPLOYMENT, POPULATION, AND PERSONAL INCOME: 1960-1982 -- Con.

YEAR	SPOP	OPOP	HPOP	MPOP	KPOP	T	SYP	OYP	HYP	MYP	KYP
*****	*****	*****	*****	*****	*****	***	*****	*****	*****	*****	*****
1960	641500	509993	60943	42980	28226	1	1428.6	1177.1	120.0	78.6	52.9
1961	658700	527619	60600	42816	28324	2	1531.5	1265.0	127.1	82.7	56.7
1962	683500	550218	60832	43744	28707	3	1626.3	1346.5	133.4	86.2	60.2
1963	682200	548489	60716	43661	29335	4	1723.4	1430.4	137.9	91.3	63.8
1964	699000	564819	61591	44094	29396	5	1856.9	1548.7	144.8	96.6	66.8
1965	703800	569374	61231	44339	28856	6	2032.7	1701.3	152.5	105.7	73.2
1966	710300	576053	61086	44749	28412	7	2237.3	1872.7	167.8	116.3	80.5
1967	722500	588115	60690	44795	28900	8	2441.1	2050.5	178.2	124.5	87.9
1968	734500	597883	61698	44805	29380	9	2717.0	2301.3	190.2	133.1	92.4
1969	750200	612163	62267	45762	30008	10	3114.3	2647.1	208.6	155.7	102.8
1970	776000	634700	64500	46700	30100	11	3566.5	3031.5	246.1	178.3	110.5
1971	801000	654400	67200	48300	31100	12	3824.0	3246.6	263.9	195.0	118.5
1972	828000	675700	70200	50300	31800	13	4177.8	3551.1	288.3	213.1	125.3
1973	851000	693400	72900	52100	32600	14	4650.3	3938.8	325.5	241.8	144.2
1974	867000	704300	75600	54300	32800	15	5297.8	4450.2	381.4	291.4	174.8
1975	884000	714300	78100	57500	34100	16	5786.0	4848.6	428.2	329.8	179.4
1976	902000	726000	80600	60200	35200	17	6222.8	5202.3	448.0	373.3	199.2
1977	916000	733800	83000	63000	36200	18	6959.5	5748.5	535.9	438.5	236.6
1978	929000	740300	85700	66000	37000	19	7698.5	6343.6	600.5	492.7	261.7
1979	950000	754000	89000	68900	38100	20	8643.8	7105.2	674.2	570.5	293.9
1980	968000	764900	92600	71300	39200	21	9761.3	8023.9	761.3	644.2	331.8
1981	981000	774000	95000	72600	39400	22	10877.8	8880.0	861.0	757.4	379.4
1982	997800	778700	100200	77000	42000	23	11662.0	9524.0	908.0	828.0	402.0

Table E-3.-- HAWAII AND COUNTY EMPLOYMENT, POPULATION, AND PERSONAL INCOME: 1960-1982 -- Con.

YEAR	SEBASIC	DEBASIC	HEBASIC	MEBASIC	KEBASIC
*****	*****	*****	*****	*****	*****
1960	79970	58260	7410	8310	5980
1961	80410	59300	7100	7970	6050
1962	79970	59600	6920	7740	5800
1963	81010	60290	6900	8150	5620
1964	83190	62690	6810	8400	5310
1965	85180	64170	7330	8590	5130
1966	88790	67280	7680	8650	5140
1967	94320	71980	8120	8950	5320
1968	96560	73950	8610	8610	5360
1969	100240	77560	8520	8780	5400
1970	102760	79160	9760	8730	5130
1971	104030	80070	9650	8900	5440
1972	106760	82570	10030	8950	5170
1973	107600	83030	10320	8890	5310
1974	107260	83240	10430	8850	4790
1975	110190	83900	11310	9720	5270
1976	111880	84770	11240	10280	5580
1977	114690	86580	11530	10800	5780
1978	119290	89730	11750	11730	5930
1979	122100	91960	11830	12150	6120
1980	123360	92380	11670	12880	6430
1981	124710	92050	12220	13770	6620
1982	126310	92300	12380	15020	6660

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